# 6.0 Routine Environmental Monitoring

The current scope of environmental monitoring addresses water (both surface water and groundwater), ecology, and air. Section 6.1 addresses water monitoring, Section 6.2 describes ecological monitoring, and Section 6.3 summarizes air monitoring.

The RFLMA consultative process will be followed to discuss any modifications to the monitoring that is performed in accordance with RFLMA (i.e., as defined in Attachment 2 to RFLMA). Consultation will be documented in a RFLMA Contact Record (see Section 15.2.1) and incorporated into Attachment 2 to RFLMA during the next revision of RFLMA.

## 6.1 Water Monitoring

The primary objective of all water monitoring at the Site is protection of surface water quality. Groundwater is monitored because groundwater contaminant plumes occur within the COU boundaries (Figure 6–1) and have the potential to degrade surface water quality. Groundwater is monitored along pathways to surface water to provide early detection of potential impacts to the surface water quality. The contaminants of interest include various VOCs, nitrate, and uranium. This contamination is the result of decades of production-related activities including waste storage, disposal practices that were acceptable at the time, spills, and leaks. Because of the potential for VOCs, industrial hygiene air monitoring will be performed at select water monitoring locations. Refer to the H&S folder on the RF-Share drive for information on industrial hygiene air monitoring.

The *Interim Measure/Interim Remedial Action for Groundwater at the Rocky Flats Environmental Technology Site* (Groundwater IM/IRA) (K-H 2005) and the RI/FS (DOE 2006a) provide thorough discussions of groundwater contamination at the Site. Summary information about the Individual Hazardous Substance Sites (IHSSs) and the effect of contaminated areas on groundwater during fiscal year (FY) 2004 is presented in Appendix D and earlier versions of the *Integrated Monitoring Plan* (IMP) (K-H 2004a, 2004b), in the *Rocky Flats Cleanup Agreement* (RFCA) Annual Groundwater Monitoring Reports issued for the years 1996 through 2003 (K-H 1997, 1998a, 1999, 2000a, 2001, 2002b, 2004c, 2004d), and in the *Fate and Transport Modeling of Volatile Organic Compounds at the Rocky Flats Environmental Technology Site* (VOC Modeling Report) (K-H 2004e). More thorough information on IHSSs and other contaminant source areas is presented in the original and annual updates to the *Historical Release Report* (HRR) (DOE 1992 and, for example, DOE 2006d, respectively).

Accelerated actions that are currently monitored include the soil removal actions at IHSS 118.1, Trenches T3/T4, Ryan's Pit, the Mound, and Oil Burn Pit #2; the groundwater enhancements at the Property Utilization and Disposal (PU&D) Yard, 903 Pad, and Ryan's Pit; and the groundwater plume treatment systems installed downgradient of the Mound, East Trenches (former OU 2), the former Solar Evaporation Ponds (SEP) (former OU 4), and the PLF. See RFLMA Attachment 2, Figure 2 for corresponding location information.

Surface water is similarly monitored to detect impacts from groundwater and runoff and to confirm the water quality is consistent with expected conditions. Surface water is defined here as water flowing above ground in natural or manmade channels and water detained in Site retention

ponds. Surface water may originate as water flowing from upgradient sources, precipitation[5], or groundwater discharge to the surface via seeps.

A consultative process was used to define the water monitoring network, determine the function of each location in the network, and identify the decisions supported by information from each location. DOE, CDPHE, EPA, and other stakeholder entities were directly involved in this process. RFLMA (Attachment A2) addresses water monitoring and specifies the locations, analytical requirements, and frequencies of data collection. This RFSOG provides additional information to assist Site staff in meeting the requirements of RFLMA and the CAD/ROD (Attachment A1).

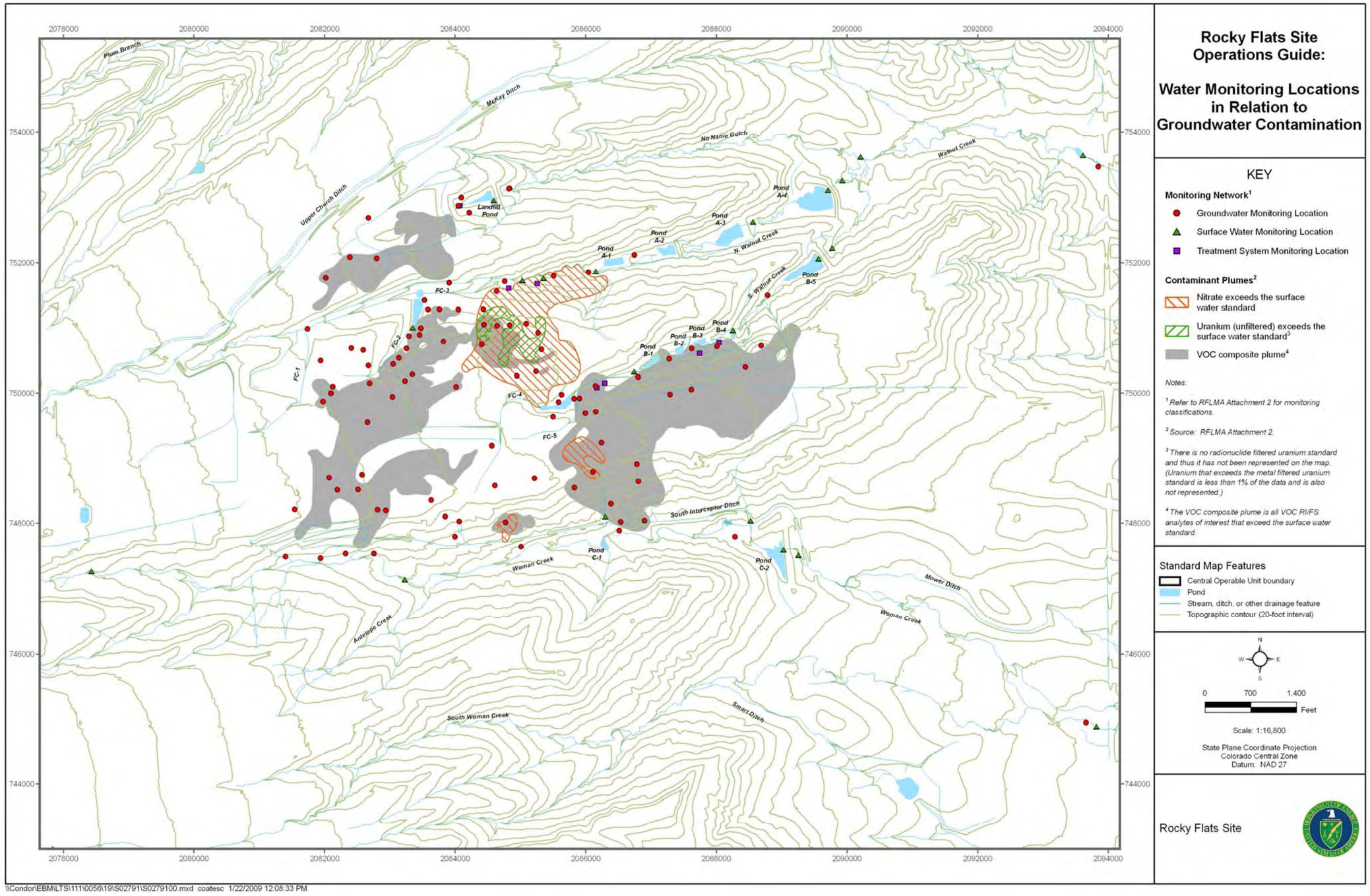
Groundwater and surface water monitoring will be conducted using methods and procedures established for the Site, in accordance with the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites* (LMS/PLN/S04351) (SAP). This document describes procedures, methods, and QA requirements for collecting and validating monitoring data. Regulatory standards for surface water and groundwater at the Site are provided in Table 1 of Attachment 2 to RFLMA. Laboratory detection limits need to be set to enable comparison with the corresponding standards. Specific monitoring locations, analyte suites, and sampling frequencies are provided in Table 2 of Attachment 2 to RFLMA. Note that the monitoring and maintenance plans for the PLF and OLF (Attachments D2 and D1, respectively) specify analytical methods that must be employed for water samples collected from monitoring locations supporting those features.

Figure 6–2 shows specific monitoring locations referenced under each monitoring objective. In the interest of fiscal and operational efficiency, some of these locations collect data to support multiple monitoring objectives. The location codes on Figure 6–2 are those used in the Site Environmental Evaluation for Projects (SEEPro) database and the Geospatial Environmental Mapping System (GEMS). SEEPro contains both pre- and post-closure locations and data; GEMS is limited to post-closure locations and data.

Specific data collection protocols are discussed in the following water monitoring sections. Section 10.3 describes the procedures for handling samples once they are collected. Each water monitoring section includes a brief description of the monitoring objective, a map of the locations, and tables detailing the data collection and evaluation protocols. RFLMA requires that analyte concentrations be compared against the greater of the standard, practical quantitation limit (PQL), or temporary modification (TM) listed in Table 1 of Attachment 2 to RFLMA, or to the appropriate uranium threshold also defined in the attachment and discussed further below. The surface water standards, PQLs, and TMs are hereafter referred to collectively as “surface water standards” or “standards.”

Water monitoring objectives are summarized in Table 6−1.

[5] Precipitation gages are positioned across the Site to collect representative Sitewide variations and allow for areal precipitation calculations.




# Rocky Flats Site Operations Guide:

# Water Monitoring Locations in Relation to Groundwater Contamination

## KEY

**Monitoring Network**[1]

- Groundwater Monitoring Location
- Surface Water Monitoring Location
- Treatment System Monitoring Location

**Contaminant Plumes**[2]

- Nitrate exceeds the surface water standard
- Uranium (unfiltered) exceeds the surface water standard[3]
- VOC composite plume[4]

*Notes:*

[1] *Refer to RFLMA Attachment 2 for monitoring classifications.*

[2] *Source: RFLMA Attachment 2.*

[3] *There is no radionuclide filtered uranium standard and thus it has not been represented on the map. (Uranium that exceeds the metal filtered uranium standard is less than 1% of the data and is also not represented.)*

[4] *The VOC composite plume is all VOC RI/FS analytes of interest that exceed the surface water standard.*

**Standard Map Features**

- Central Operable Unit boundary
- Pond
- Stream, ditch, or other drainage feature
- Topographic contour (20-foot interval)

N, W, E, S

0 700 1,400 Feet

Scale: 1:16,800

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

Rocky Flats Site

*Figure 6–1. Water Monitoring Locations in Relation to Groundwater Contamination*

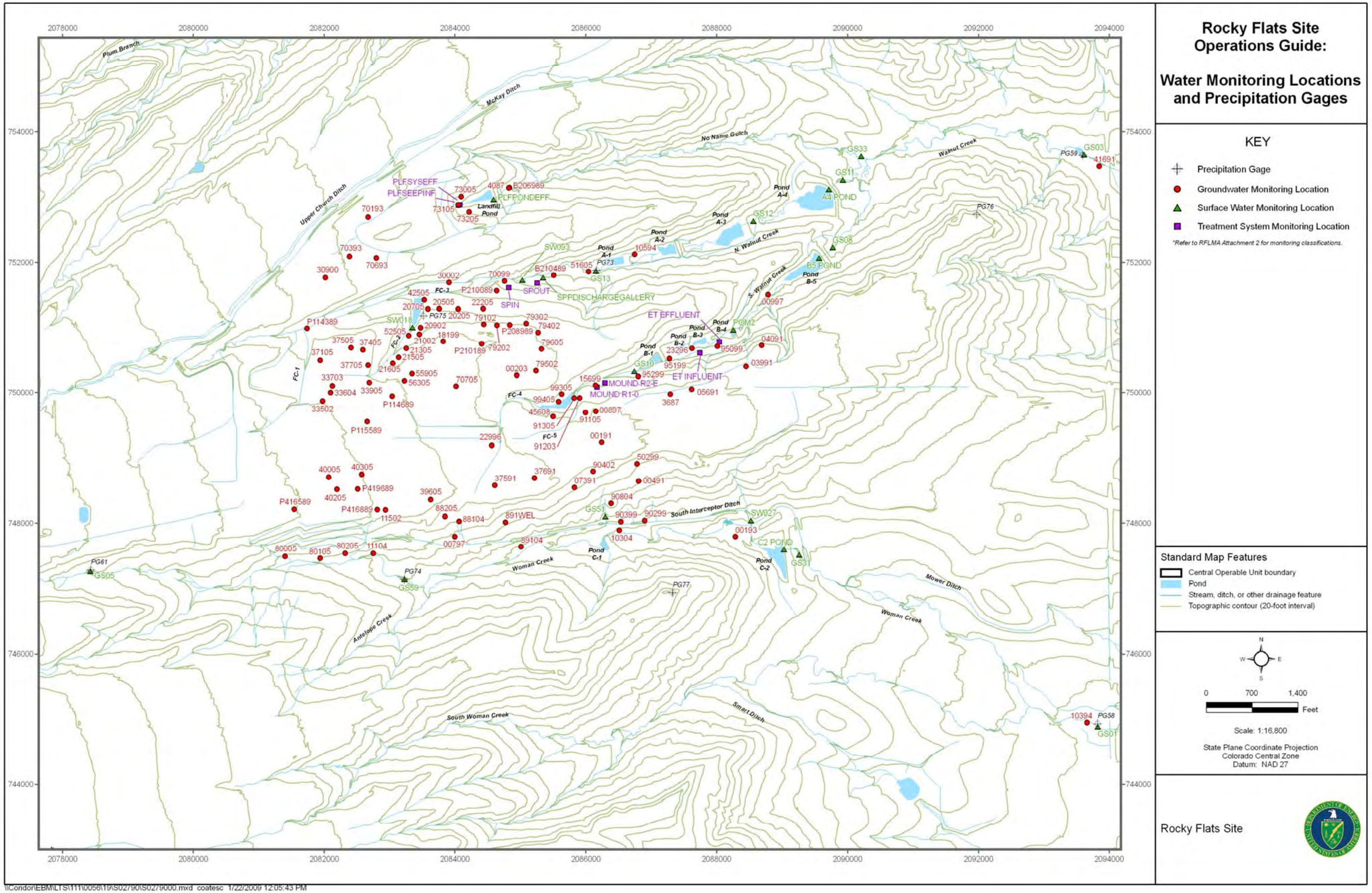



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*Figure 6–2. Water Monitoring Locations and Precipitation Gages*

*Table 6−1. Generalized Water Monitoring Objectives*

| Monitoring Objective[a] | Media | General Description | Number of Locations[b] | Sampling Frequency |
|---|---|---|---|---|
| **Point of Compliance (POC)** | **SW** | **Monitoring of discharges from the terminal ponds into Woman and Walnut Creeks and streamflow downstream at Indiana Street to demonstrate compliance with surface water quality standards.** | **5** | **Flow-paced (varies)** |
| **Point of Evaluation (POE)** | **SW** | **Monitoring of runoff and baseflow from the COU to the A-, B-, and C-Series Ponds to evaluate water quality in comparison to surface water quality standards.** | **3** | **Flow-paced (varies)** |
| **Area of Concern (AOC) and Surface Water Performance** | **GW, SW** | **Wells within a drainage and downgradient of a contaminant plume or group of contaminant plumes; also surface water monitored downgradient of a source-removal action. Monitored to determine whether the plume(s) may be discharging to surface water.** | **10** | **Semiannually** |
| **Boundary** | **GW** | **Located on the east boundary of the POU, where Walnut Creek and Woman Creek cross Indiana Street. Used to demonstrate that contaminants are not migrating off federal land. These wells are not required by the CAD/ROD, but are included in RFLMA as operational monitoring.** | **2** | **Annually** |
| **Sentinel** | **GW** | **Typically located near downgradient edges of contaminant plumes, in drainages, and downgradient of groundwater treatment systems. Monitored to determine whether concentrations of contaminants are increasing, which could indicate plume migration or treatment system problems.** | **37** | **Semiannually** |
| **Evaluation** | **GW** | **Typically located within groundwater plumes and near plume source areas, or in the interior of the COU. Data from these wells will help determine when monitoring of an area or plume can cease. A subset of these wells is located in areas that may experience significant changes in groundwater conditions as a result of closure activities.** | **42** | **Biennially (every 2 years)** |
| Investigative | SW | Monitoring upstream of POCs and POEs to provide support for source evaluations. This monitoring objective is not required by the CAD/ROD or RFLMA, but is included as operational monitoring. | 5 | Flow-paced (varies) |
| **RCRA** | **GW** | **Dedicated to monitoring the PLF and OLF.** | **10** | **Quarterly** |
| **OLF Surface Water** | **SW** | **Dedicated to monitoring surface water upgradient and downgradient of the OLF to confirm the effectiveness of the remedy.** | **2** | **Flow-paced (varies), and quarterly grabs** |
| **Treatment System** | **GW, SW** | **Four groundwater treatment systems collect and treat contaminated groundwater and discharge the treated water to surface water. Each system is monitored, at a minimum, for influent and effluent water quality, and for impacts to surface water downstream of the effluent discharge point. Not all locations are required by the CAD/ROD or RFLMA; some are included in the network as operational monitoring.** | **13** | **GW: Semiannually<br>SW: Semiannually, quarterly, monthly (varies by monitoring objective)** |
| **Pre-discharge** | **SW** | **Pre-discharge sampling of Ponds A-4, B-5, and C-2, or any other upstream pond functioning as a terminal pond, as a BMP to indicate compliance with surface water quality standards. This monitoring objective is not required by the CAD/ROD, but is included in RFLMA as operational monitoring.** | **3** | **Varies – based on discharge frequency** |
| No Name Gulch Flow Monitoring | SW | Monitoring streamflow in No Name Gulch at the confluence with Walnut Creek to determine relative streamflow contributions. This monitoring objective is not required by the CAD/ROD or RFLMA, but is included as operational monitoring. | 1 | Not applicable |
| Indicator Parameter Monitoring | SW | Monitoring for general water quality and quantity information to be used for various data assessments. This monitoring objective is not required by the CAD/ROD or RFLMA, but is included as operational monitoring. | 10 | Varies by primary monitoring objective[2] |
| Water Level | GW | Located between areas being actively monitored and in areas subject to changing flow conditions. Also available to support groundwater evaluations if needed. Only water level data will typically be collected from these wells. These wells are not required by the CAD/ROD or RFLMA, but are included in the network as operational monitoring. | 8 | Varies – minimum of quarterly to semiannually |

Notes: [a]Monitoring objectives for groundwater wells are also referred to as well classifications. Objectives listed in **bold** are required by RFLMA.
[b]Surface water locations can serve multiple monitoring objectives. Groundwater wells may also serve multiple data needs, but are only assigned a single well classification.

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### 6.1.1 Point of Compliance (POC) Monitoring

This objective deals with monitoring discharges from the terminal ponds into Woman and Walnut Creeks and streamflow downstream at Indiana Street to demonstrate compliance with surface water quality standards (see Table 1 of Attachment 2 to RFLMA). Terminal pond discharges will be monitored by POCs GS11, GS08, and GS31. Walnut Creek will be monitored at Indiana Street by POC GS03. Woman Creek will be monitored at Indiana Street by POC GS01. These locations are shown on Figure 6–3.

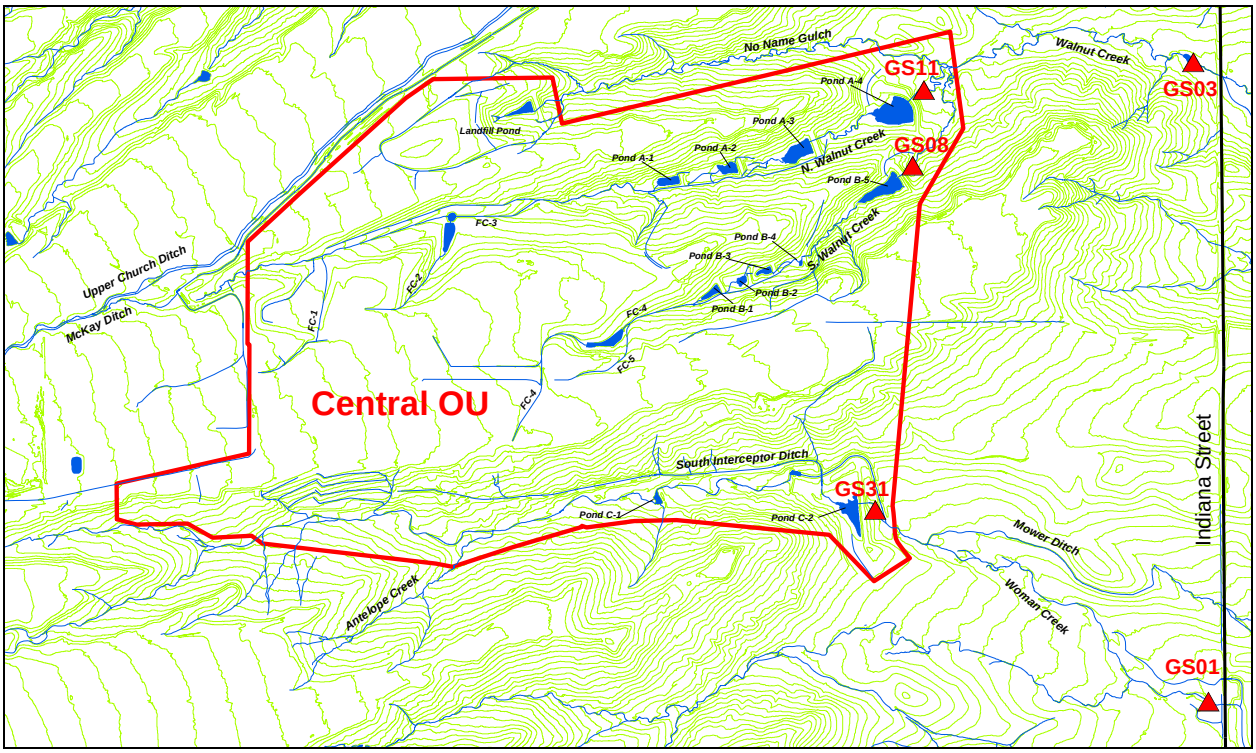



*Figure 6–3. POC Monitoring Locations*

***Data and Sample Collection Protocols***

Details on the instrumentation for the five POC locations are provided in Table 6−2. Continuous flow and precipitation data are collected using automated instrumentation (Table 6−3).[6] POCs collect continuous flow-paced composite samples for select analytes (Table 6−4). The method used to determine appropriate flow-pacing for composite samples is discussed in Section 8.1.1. Sample scheduling targets are listed in Table 6−5. Composite samples must be segregated based on water origin (natural creek flows or terminal pond discharges commingled with natural flows).

[6] Precipitation data are not required for this objective; flow measurement is required to flow-pace the automated samplers.

*Table 6−2. POC Monitoring Locations*

| Location Code | Location Description | Primary Flow Measurement Device | Telemetry? |
|---|---|---|---|
| GS01 | Woman Creek and Indiana Street | 18-inch Parshall Flume[a] | Yes |
| GS03 | Walnut Creek and Indiana Street | 3-foot HL-Flume | Yes |
| GS08 | Pond B-5 outlet | 24-inch Parshall Flume | Yes |
| GS11 | Pond A-4 outlet | 24-inch Parshall Flume | Yes |
| GS31 | Pond C-2 outlet | 24-inch Parshall Flume | Yes |

Notes: [a]This flume is located east on Indiana Street and is owned by the Woman Creek Reservoir Authority; DOE has a Use Agreement with the Woman Creek Reservoir Authority to use this flume (see Attachment A5); sampling for POC GS01 takes place west of Indiana Street within the Refuge boundary.

*Table 6−3. POC Field Data Collection: Parameters and Frequency*

| Location Code | Flow Rate | Precipitation |
|---|---|---|
| GS01 | 15-minute continuous | 5-minute continuous |
| GS03 | 15-minute continuous | 5-minute continuous |
| GS08 | 15-minute continuous | NA |
| GS11 | 15-minute continuous | NA |
| GS31 | 15-minute continuous | NA |

Notes: All locations collect both 5- and 15-minute interval flow data.
NA = not applicable

*Table 6−4. POC Sample Collection: Type and Analytes*

| Location Code | Type[a] | Analytes |
|---|---|---|
| GS01 | Continuous flow-paced composites | Pu-239,240; Am-241; isotopic U[b] |
| GS03 | Continuous flow-paced composites | Pu-239,240; Am-241; isotopic U[b]; nitrate[c] |
| GS08 | Continuous flow-paced composites | Pu-239,240; Am-241; isotopic U[b]; nitrate[c] |
| GS11 | Continuous flow-paced composites | Pu-239,240; Am-241; isotopic U[b]; nitrate[c] |
| GS31 | Continuous flow-paced composites | Pu-239,240; Am-241; isotopic U[b] |

Notes: [a]Sample types are defined in Section 8.1.1.
[b]Isotopes U-233,234; U-235; U-238
[c]Nitrate will be analyzed for samples collected *only* at Walnut Creek POCs and *only* during terminal pond discharges. Nitrate is analyzed as nitrate+nitrite as N; this result is conservatively compared to the nitrate standard only.

*Table 6−5. Annual POC Monitoring Targets (Number of Composite Samples)*

| Time Period | Pond A-4 (GS11) | Pond B-5 (GS08) | Pond C-2 (GS31) | Walnut Creek at Indiana Street (GS03) | Woman Creek at Indiana Street (GS01) | Total Number of Samples |
|---|---|---|---|---|---|---|
| Discharges | 14 | 14 | 7 | 14 | 7 | 56 |
| **Storm and Baseflow[a]** | | | | | | |
| October | NA | NA | NA | 1 | 1 | 2 |
| November | NA | NA | NA | 0 | 1 | 1 |
| December | NA | NA | NA | 1 | 2 | 3 |
| January | NA | NA | NA | 0 | 2 | 2 |
| February | NA | NA | NA | 1 | 2 | 3 |
| March | NA | NA | NA | 4 | 5 | 9 |
| April | NA | NA | NA | 6 | 6 | 12 |
| May | NA | NA | NA | 4 | 6 | 10 |
| June | NA | NA | NA | 1 | 1 | 2 |
| July | NA | NA | NA | 0 | 0 | 0 |
| August | NA | NA | NA | 1 | 1 | 2 |
| September | NA | NA | NA | 0 | 0 | 0 |
| **Annual Total** | 14 | 14 | 7 | 33 | 34 | 102 |

Notes: [a]The storm and baseflow monthly sample distribution is based on expected water availability that is predicted from historic flow data. This distribution is intended to be periodically modified as additional flow data are collected.
NA = not applicable

With the removal of impervious surfaces at the Site, flow volumes have decreased significantly. In addition, hydrologic modeling and recent monitoring data have indicated that in a typical year with discharges taking place, estimated discharge volumes from Ponds A-4, B-5, and C-2 would be approximately 10 to 12, 5 to 7, and 3 to 4 MG, respectively. Based on variability of past monitoring data, and to achieve sufficient confidence for decision making, annual frequency targets for Pond A-4 will be one composite for every 790,000 gallons of discharge volume, targets for Pond B-5 will be one composite for every 430,000 gallons, and targets for Pond C-2 will be one composite for every 500,000 gallons. Additionally, no more than one composite per day of discharge will be collected for logistical purposes. For annual planning purposes, 14 composites will be collected from Pond A-4, 14 from Pond B-5, and 7 from Pond C-2, resulting in the collection of 35 total composite samples from terminal pond POCs (see Table 6−5).

The Indiana Street POCs collect the same number of samples as the terminal ponds during discharges, plus additional samples from storm runoff and baseflow between discharges. GS01 will collect seven samples for the expected Pond C-2 discharges. Storm runoff and baseflow samples will be collected based on historic flow data. Based on variability of past monitoring data and to achieve sufficient confidence for decision making, the frequency target for storm runoff and baseflow sampling at GS01 is 27 composites per year, with a maximum target of six samples during any one month (see Table 6−5).

GS03 will collect the targeted 14 samples during Pond A-4 and Pond B-5 discharges. GS03 will collect the same number of composite samples as the terminal pond POCs for each discharge. Ponds A-4 and B-5 will be discharged concurrently, where possible. Based on variability of past

monitoring data and to achieve sufficient confidence for decision making, the frequency target for storm runoff and baseflow sampling at GS03 is 19 composites per year, with a maximum target of six samples during any one month (see Table 6−5).

The sample counts given in Table 6−5 are annual targets only. During dry years, it is unlikely the targets will be achieved.

***Data Evaluation***

Compliance with surface water quality standards (see Table 1 of Attachment 2 to RFLMA) at POCs is demonstrated according to the Figure 5 flowchart in RFLMA. Methods for calculating the appropriate compliance values are discussed in Section 8.2.1.

Generally, analytical data evaluation is performed as data become available. If an initial qualitative screening indicates an analytical result is higher than the standard for a particular analyte, then the compliance values are calculated immediately. If the compliance values suggest a reportable condition, then validation is requested for all data packages used in the calculation. The desired evaluation frequency is semimonthly, within 1 week of the 15th and last day of any given month.

### 6.1.2 POE Monitoring

This objective deals with monitoring runoff and baseflow from the interior of the COU to the A-, B-, and C-Series Ponds to evaluate water quality in comparison to surface water quality standards (see Table 1 of Attachment 2 to RFLMA). Surface water will be monitored by Points of Evaluation (POEs) SW093, GS10, and SW027 on North Walnut Creek, South Walnut Creek, and the SID, respectively. These locations are shown on Figure 6–4.

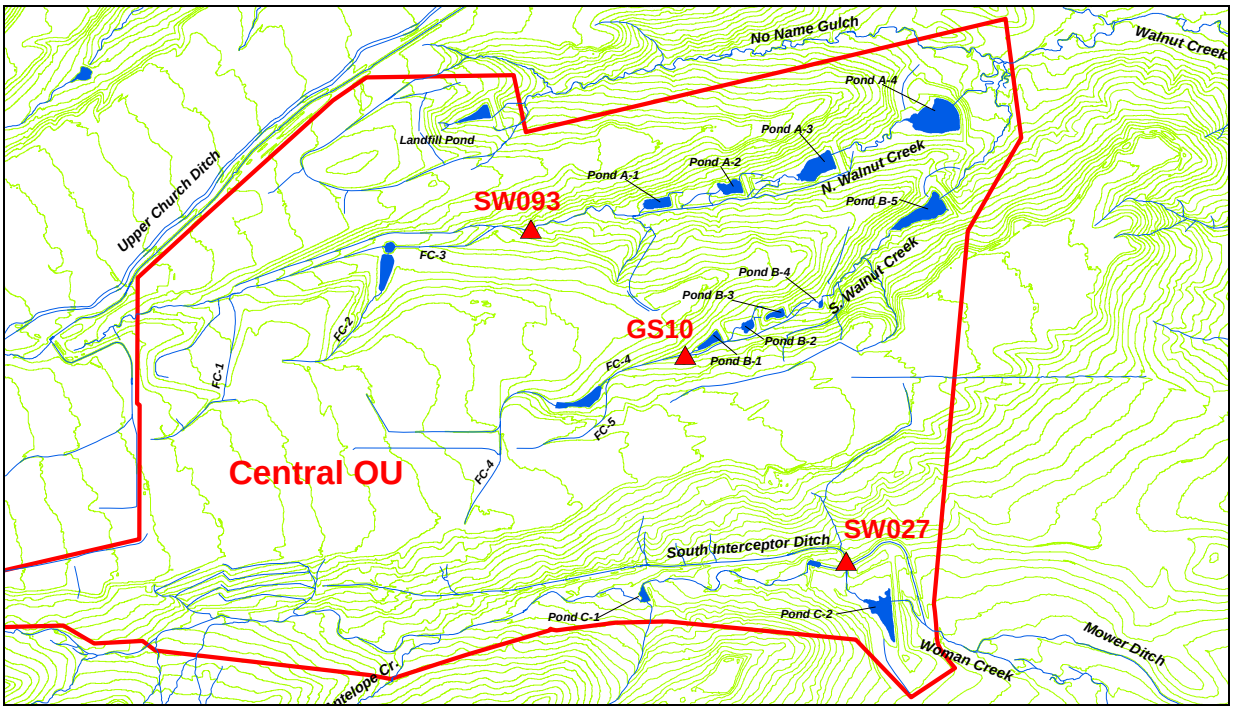



*Figure 6–4. POE Monitoring Locations*

### *Data and Sample Collection Protocols*

Details on instrumentation for the three POE locations are provided in Table 6−6. Continuous flow data are collected using automated instrumentation (Table 6−7). POEs collect continuous flow-paced composite samples for select analytes (Table 6−8). The method used to determine appropriate flow-pacing for composite samples is discussed in Section 8.1.1. Sample scheduling targets are listed in Table 6−9.

*Table 6−6. POE Monitoring Locations*

| Location Code | Location Description | Primary Flow Measurement Device | Telemetry? |
|---|---|---|---|
| GS10 | South Walnut Creek upstream from the B-1 Bypass | 9-inch Parshall Flume with weir insert | Yes |
| SW027 | SID just upstream of Pond C-2 | Dual Parallel 120° V-Notch Weirs | Yes |
| SW093 | North Walnut Creek 1,300 feet upstream from the A-1 Bypass | 3-foot H-Flume | Yes |

*Table 6−7. POE Field Data Collection: Parameters and Frequency*

| Location Code | Flow Rate |
|---|---|
| GS10 | 15-minute continuous |
| SW027 | 15-minute continuous |
| SW093 | 15-minute continuous |

Note: All locations collect both 5- and 15-minute interval flow data.

*Table 6−8. POE Sample Collection: Type and Analytes*

| Location Code | Type[a] | Analytes |
|---|---|---|
| GS10 | Continuous flow-paced composites | Pu-239,240; Am-241; isotopic U[b]; total Be and Cr; dissolved Cd and Ag |
| SW027 | Continuous flow-paced composites | Pu-239,240; Am-241; isotopic U[b]; total Be and Cr; dissolved Cd and Ag |
| SW093 | Continuous flow-paced composites | Pu-239,240; Am-241; isotopic U[b]; total Be and Cr; dissolved Cd and Ag |

Notes: [a]Sample types are defined in Section 8.1.1.
[b]Isotopes U-233,234; U-235; U-238

*Table 6−9. Annual POE Monitoring Targets (Number of Composite Samples)*

| Month | Number of Samples[a] | | | |
|---|---|---|---|---|
| | SW093 | GS10 | SW027 | Total |
| October | 1 | 2 | 1 | 4 |
| November | 1 | 1 | 0 | 2 |
| December | 1 | 1 | 0 | 2 |
| January | 1 | 1 | 0 | 2 |
| February | 1 | 1 | 0 | 2 |
| March | 2 | 2 | 2 | 6 |
| April | 3 | 3 | 5 | 11 |
| May | 2 | 1 | 4 | 7 |
| June | 1 | 1 | 1 | 3 |
| July | 0 | 0 | 1 | 1 |
| August | 1 | 1 | 1 | 3 |
| September | 0 | 0 | 0 | 0 |
| **Annual Total** | 14 | 14 | 15 | 43 |

Notes: [a]Monthly sample distribution is based on expected water availability that is predicted from historic flow data. This distribution is intended to be periodically modified as additional flow data are collected.

Based on variability of past monitoring data, and to achieve sufficient confidence for decision making, annual frequency targets for SW093, GS10, and SW027 will be 14, 14, and 15 composites, respectively. Additionally, no more than five composites per month will be targeted (see Table 6−9).

The sample counts listed in Table 6−9 are annual targets only. During dry years, it is unlikely the targets will be achieved.

***Data Evaluation***

Evaluation of analytical results in comparison to surface water quality standards (see Table 1 of Attachment 2 to RFLMA) at POEs is performed according to the Figure 6 flowchart in RFLMA. Methods for calculating the appropriate values for comparison are discussed in Section 8.2.1.

Generally, analytical data evaluation is performed as data become available. If an initial qualitative screening indicates an analytical result is higher than the standard for a particular analyte, then the compliance values are calculated immediately. If the compliance values suggest a reportable condition, then validation is requested for all data packages used in the calculation. The desired evaluation frequency is semimonthly, within 1 week of the 15th and last day of any given month.

### 6.1.3 AOC Wells and SW018

Area of Concern (AOC) wells (Figure 6–5) are located to evaluate potential groundwater impacts to surface water. Impacts will be based on a minimum of two routinely scheduled sampling events in a row, not on a single data point. Analytical results from AOC wells are compared directly against the appropriate surface water standards in Table 1 of Attachment 2 to RFLMA or

the uranium threshold. Analytical data from surface water performance location SW018, where grab samples for VOCs are collected to support groundwater objectives, are assessed in a manner similar to data from AOC wells.

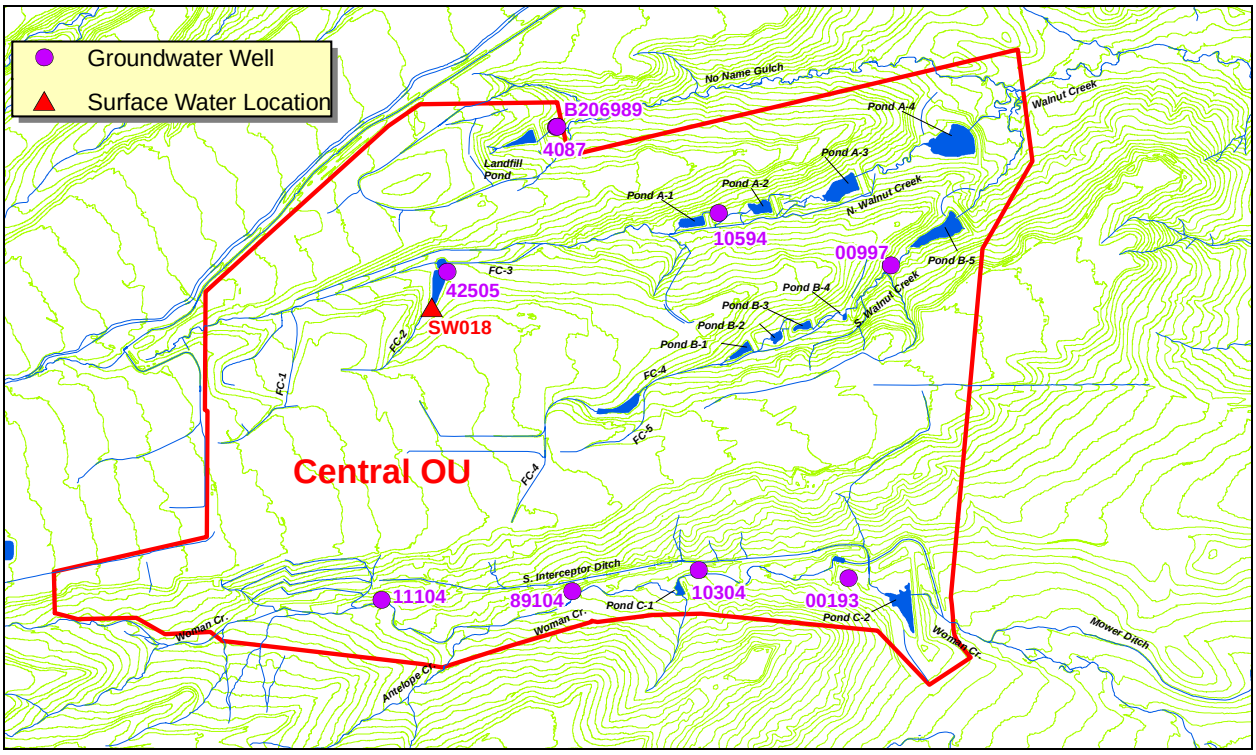



*Figure 6–5. AOC Well and SW018 Locations*

### *Data and Sample Collection Protocols*

General monitoring information for AOC wells and SW018 is provided in Table 6−10. Sampling frequencies are summarized in Table 6−11.

The data evaluation process guiding the use of analytical data from AOC wells and SW018 is shown on the Figure 7 flowchart in RFLMA (Attachment A2); because similar rules guide the use of data at Boundary wells, this figure applies to both well classifications.

Additional explanation is warranted for surface water station SW018, discussed here with AOC wells. This location is in the unnamed tributary to North Walnut Creek that is part of the larger FC-2 drainage and is generally downgradient (west-northwest) of IHSS 118.1. This IHSS was the site of historic spills of carbon tetrachloride that created a pool of dense nonaqueous-phase liquid within an excavation formed in the lower-permeability claystone, in which a carbon tetrachloride tank was installed. The IHSS was remediated by source removal followed by backfilling the excavation with Hydrogen Release Compound® (HRC®) in 2004; however, an associated plume of VOC-contaminated groundwater persists. The historic flow direction of this plume was toward the west and the tributary to North Walnut Creek. The predicted post-closure flow direction is more northerly, generally toward Sentinel well 20505. To assess whether the plume is impacting surface water in the unnamed drainage, SW018 is monitored for VOCs.

*Table 6−10. AOC Wells and SW018*

| Location Code | Location Description | Analytes[a] |
|---|---|---|
| 00193 | Woman Creek upstream of Pond C-2 | VOCs, U |
| 00997 | South Walnut Creek upstream of Pond B-5 | VOCs, U, nitrate |
| 10304 | Southeast of 903 Pad/Ryan's Pit Plume at Woman Creek | VOCs, U, nitrate |
| 10594 | North Walnut Creek downstream of Pond A-1 | VOCs, U, nitrate |
| 11104 | Downgradient, downstream of the OLF and downgradient of the IA Plume | VOCs, U |
| 4087 | Below Landfill Pond | VOCs, U, nitrate |
| 42505 | Terminus of FC-2 | VOCs |
| 89104 | Downgradient of OU 1 Plume at Woman Creek | VOCs |
| B206989 | Below Landfill Pond | VOCs, U, nitrate |
| SW018 | Upstream of FC-2 wetland | VOCs |

Notes: [a]Samples for the analysis of U will be field-filtered using a 0.45-micron in-line filter.
Nitrate is analyzed as nitrate+nitrite as N; this result is conservatively compared to the nitrate standard only.

*Table 6−11. Sampling Frequency for AOC Wells and SW018*

| Sampling Frequency | Timing | Schedule Considerations |
|---|---|---|
| Semiannual | Second and fourth calendar quarters (high- and low-water conditions, respectively) | Attempt to sample with other locations monitoring the same plume(s) |

### *Data Evaluation*

Compliance with surface water quality standards (see Table 1 of Attachment 2 to RFLMA) at AOC wells and SW018 is demonstrated by the Figure 7 flowchart in RFLMA. Analytical data evaluation is performed as data become available; this is necessary because of the strict timeline attached to "reportable conditions" for AOC wells (the requirement for SW018 is slightly different, as shown on the flowchart). In accordance with and as defined in RFLMA, if the data are confirmed to be valid and meet the requirements of a reportable condition, the reporting process is initiated.

The data will be reviewed to determine whether monitoring may be discontinued as upgradient monitoring ceases and analytical results at a given AOC well (or SW018) reach the exit requirements described on the data evaluation flowchart in RFLMA (Figure 7, Attachment A2). Once monitoring has ceased, corresponding data reviews, data reporting, and monitoring decisions will no longer be required.

## 6.1.4 Boundary Wells

Boundary wells (Figure 6–6) are located at the Walnut Creek/Indiana Street and Woman Creek/Indiana Street intersections and are monitored to assure surrounding stakeholders that groundwater leaving the historic RFP in these drainages is not adversely impacted by the Site.

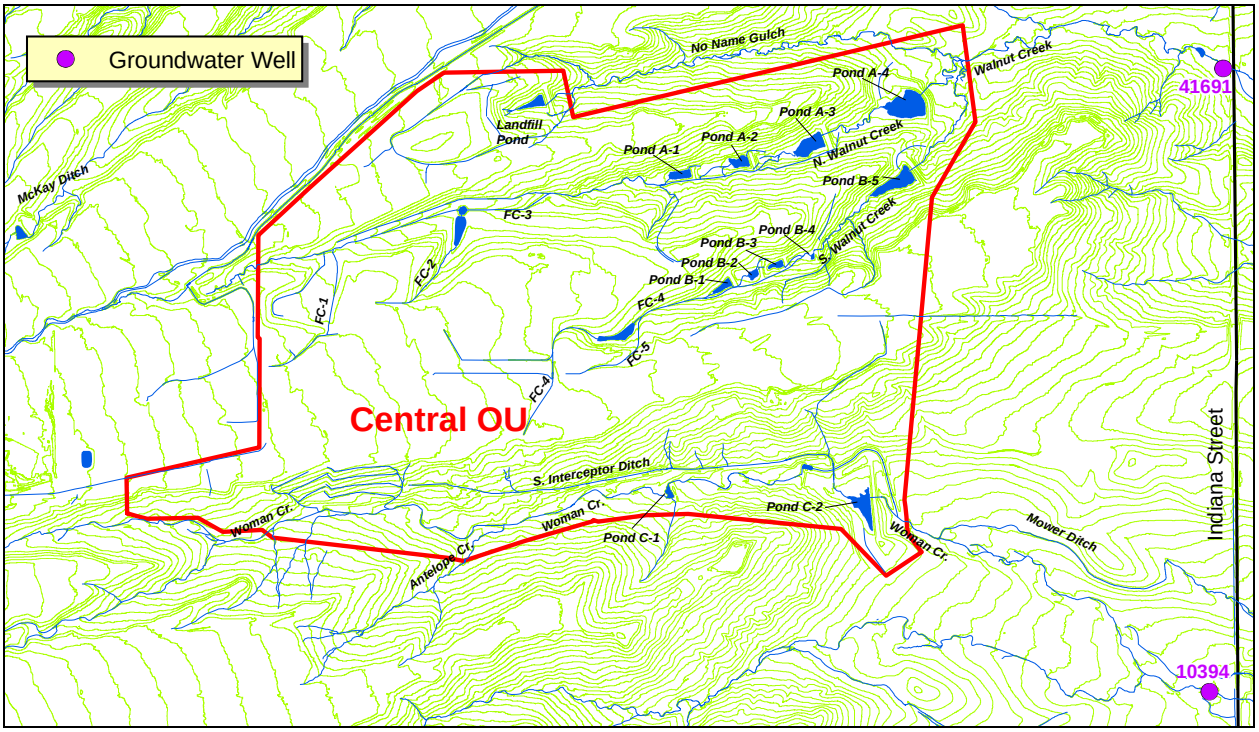



*Figure 6–6. Boundary Well Locations*

Boundary wells are not required by the CAD/ROD, nor have they supported the technical groundwater monitoring requirements defined by the preceding IMPs (e.g., DOE 2006e, 2006f). However, these wells are included in the network to satisfy operational monitoring requirements in RFLMA (Attachment A2).

### *Data and Sample Collection Protocols*

General monitoring information on Boundary wells is provided in Table 6−12. Sampling frequencies are summarized in Table 6−13.

*Table 6−12. Boundary Wells*

| Location Code | Location Description | Analytes[a] |
|---|---|---|
| 10394 | Woman Creek at Indiana Street | VOCs, U, nitrate |
| 41691 | Walnut Creek at Indiana Street | VOCs, U, nitrate |

Notes: [a]Samples for the analysis of U will be field-filtered using a 0.45-micron in-line filter. Nitrate is analyzed as nitrate+nitrite as N; this result is conservatively compared to the nitrate standard only.

*Table 6−13. Sampling Frequency of Boundary Wells*

| Sampling Frequency | Timing | Schedule Considerations |
|---|---|---|
| Annual | Second calendar quarter (high-water conditions) | None |

The data evaluation process guiding the use of analytical data from Boundary wells is shown on the Figure 7 flowchart in RFLMA (Attachment A2). Because similar rules guide the use of data at AOC wells and SW018, this figure applies to both well classifications.

***Data Evaluation***

Compliance with surface water quality standards (see Table 1 of Attachment 2 to RFLMA) at Boundary wells is demonstrated by the Figure 7 flowchart in RFLMA. Analytical data evaluation is performed as data become available; this is necessary because of the strict timeline attached to "reportable conditions" for Boundary wells. In accordance with and as defined in RFLMA, if the data are confirmed to be valid and meet the requirements of a reportable condition, the reporting process is initiated.

The determination of whether monitoring a Boundary well may cease will be made as upgradient monitoring ceases and analytical results at the Boundary well approach exit requirements. When upgradient wells are no longer monitored and concentrations in the Boundary well meet the applicable standards and/or uranium threshold, conditions will be reviewed with the regulatory agencies to seek approval to cease monitoring by well or analyte suite, as appropriate. Once monitoring has ceased, corresponding data reviews, data reporting, and monitoring decisions will no longer be required.

### 6.1.5 Sentinel Wells

Sentinel wells (Figure 6–7) are located near downgradient edges of contaminant plumes, in drainages, at groundwater treatment systems, and along contaminant pathways to surface water. These wells are monitored to determine whether concentrations of contaminants are increasing, thereby providing advance warning of potential groundwater quality impacts to the downgradient AOC well(s). Confirmation of a potential impact to downgradient wells will require an analytical record that consistently indicates an impact, not a single data point that indicates a contaminant has been detected.

Sentinel wells are used to monitor the performance of an accelerated action (including soil/source removals, in-situ contaminant plume treatment, groundwater intercept components of treatment systems, and facility demolitions) and assess contaminant trends at important locations. Data from Sentinel wells are supplemented by those from Evaluation wells and are used to determine when monitoring may cease or additional remedial work should be considered.

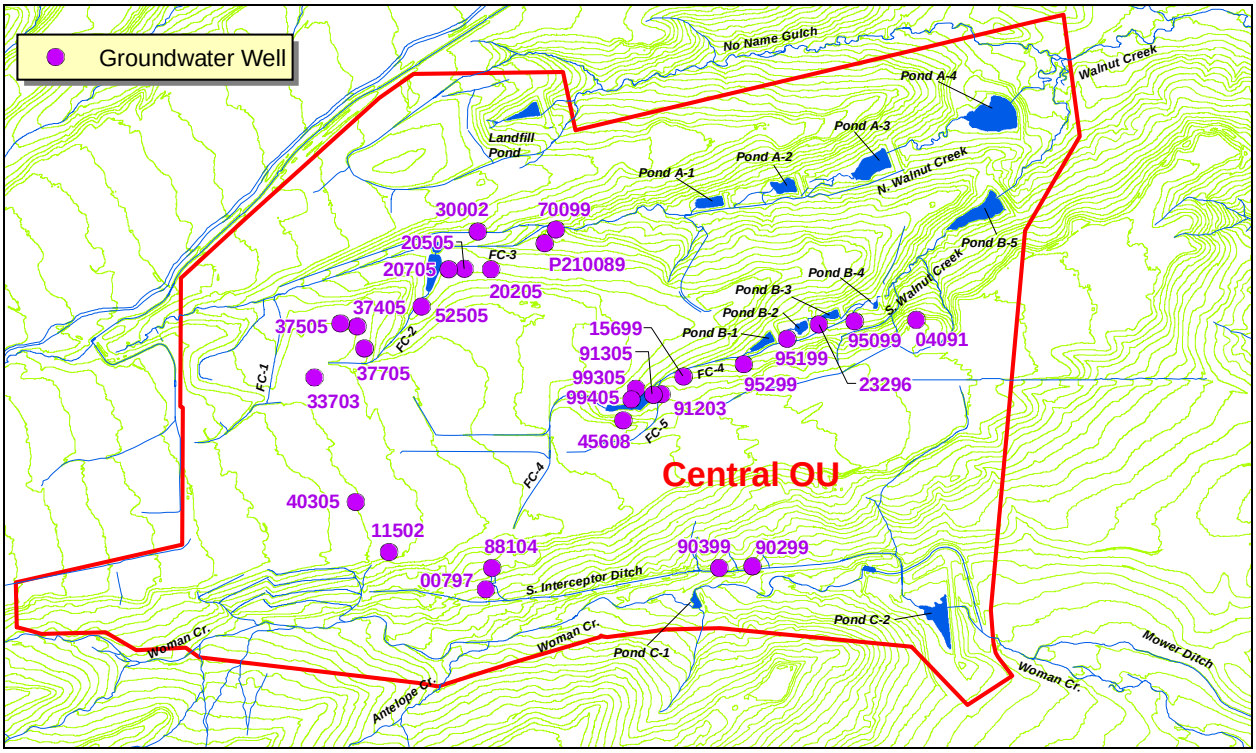



*Figure 6–7. Sentinel Well Locations*

### *Data and Sample Collection Protocols*

General monitoring information for Sentinel wells is provided in Table 6−14. Sampling frequencies are summarized in Table 6−15.

*Table 6−14. Sentinel Wells*

| Location Code | Location Description | Analytes[a] |
|---|---|---|
| 00797 | South of former Building 881 (B881) area | VOCs, U |
| 04091 | East of source area | VOCs |
| 11502 | Southeast of former B444 area | VOCs, U |
| 15699 | Downgradient of MSPTS intercept trench | VOCs |
| 20205 | North/northeast of former B771/774 area | VOCs, U, Pu, Am |
| 20505 | North of former B771/774 area | VOCs, U, Pu, Am |
| 20705 | North/northwest of former B771 area | VOCs, U, nitrate, Pu, Am |
| 23296 | Downgradient of ETPTS intercept trench | VOCs, U |
| 30002 | Downgradient at North Walnut Creek | VOCs |
| 33703 | Downgradient of source area | VOCs |
| 37405 | North/northeastern part of former B371/374 area | VOCs, U, nitrate, Pu, Am |
| 37505 | Northern part of former B371 area | VOCs, U, nitrate |
| 37705 | East/southeast of former B371/374 area at foundation drain confluence | VOCs, U, nitrate, Pu, Am |
| 40305 | Eastern part of former B444 area | VOCs, U |
| 45608 | Adjacent to remnants of SW056 French drain and drain interruption[b] | VOCs |
| 52505 | West of former IHSS 118.1 area | VOCs |
| 70099 | Northwest (sidegradient) of SPPTS intercept trench | U, nitrate |
| 88104 | Southern part of former B881 area | VOCs, U |
| 90299 | Southeastern part of 903 Pad/Ryan's Pit Plume at SID | VOCs |
| 90399 | Southeastern part of 903 Pad/Ryan's Pit Plume at SID | VOCs |
| 91203 | Downgradient of Oil Burn Pit #2 source area | VOCs |
| 91305 | South of confluence of FC-4 and FC-5 | VOCs, U, nitrate |
| 95099 | Downgradient of ETPTS intercept trench | VOCs |
| 95199 | Downgradient of ETPTS intercept trench | VOCs |
| 95299 | Downgradient of ETPTS intercept trench | VOCs |
| 99305 | Eastern part of former B991 area | VOCs, U, nitrate |
| 99405 | Southeastern part of former B991 area | VOCs, U, nitrate |
| P210089 | Downgradient (north) portion of SPP | VOCs, U, nitrate |

Notes: [a]Samples for the analysis of U, Pu, and Am will be field-filtered using a 0.45-micron in-line filter.
Nitrate is analyzed as nitrate+nitrite as N; this result is conservatively compared to the nitrate standard only.
[b]Until RFLMA is updated to reflect a well replacement made in 2008, the requirements applying to well 45608 refer instead to well 45605. Also, requirements associated with well TH046992 (listed in RFLMA, deleted from this table) have been eliminated and that well has been abandoned.
SPP = Solar Ponds Plume

*Table 6−15. Sampling Frequency for Sentinel Wells*

| Sampling Frequency | Timing | Schedule Considerations |
|---|---|---|
| Semiannual | Second and fourth calendar quarters (high- and low-water conditions, respectively) | Attempt to sample with other locations monitoring the same plume(s)/area(s) |

***Data Evaluation***

Analytical data from Sentinel wells are evaluated according to the Figure 8 flowchart in RFLMA (Attachment A2). Analytical data evaluation may be performed as data become available, but only needs to be reported in the corresponding annual report. For a discussion on the statistical analysis of data, see Section 8.2.2.

If groundwater quality is worsening and fails the criteria described on the Figure 8 flowchart in RFLMA, more thorough assessment and investigation is required. If the 85th percentile concentration of a constituent of interest is greater than the corresponding surface water standard or uranium threshold, as appropriate (Criterion 1), **and** concentrations exhibit a statistically significant increasing trend at 95 percent confidence (Criterion 2), data from the Sentinel wells and upgradient wells will be reviewed. Possible causal factors and conditions will be identified, and actions that may either alleviate these factors and conditions or characterize them adequately for the appropriate action to be identified will be proposed. The analytical data and this discussion will be included in the subsequent periodic report.

Conversely, as monitoring ceases in upgradient wells (i.e., wells monitoring an area of interest or source area where there is a potential for groundwater contamination to migrate to a given Sentinel well), consideration of the exit strategy is warranted. When upgradient monitoring ceases (either entirely or for a given analyte or suite of analytes) and groundwater quality in the given Sentinel well meets both criteria described on the Figure 8 flowchart in RFLMA (Attachment A2), discussions with the regulatory agencies regarding exiting monitoring (again, either entirely or for a given analyte or suite of analytes) will be initiated. If more than one Sentinel well is in the same downgradient direction of the area or plume of interest (as is the case with Sentinel wells 88104 and 00797 downgradient of former Building 881, or wells 90299 and 90399 monitoring the Ryan's Pit/903 Pad Plume), it may be that each of these wells will need to satisfy the exit criteria before discontinuing monitoring. Review of data to determine whether monitoring may cease will be performed as upgradient monitoring and analytical results approach exit requirements. Once monitoring has ceased, corresponding data reviews, data reporting, and monitoring decisions will no longer be required.

### 6.1.6 Evaluation Wells

Evaluation wells (Figure 6–8) are located within groundwater contaminant plumes and near plume source areas, and within the interior of the COU at the Site. As such, they may monitor the effects of accelerated actions that have been performed (e.g., source removal and in-situ treatment). Data from these Evaluation wells are therefore appropriate to determine whether monitoring of a particular plume and source area may cease, and provide data to support the determination of whether corresponding groundwater plume treatment systems may be decommissioned. In addition, Evaluation wells are used to support any groundwater evaluations that may be needed as a result of changing contaminant characteristics in downgradient Sentinel and/or AOC wells. Data from these wells also assist evaluations of predictions made through groundwater modeling efforts.

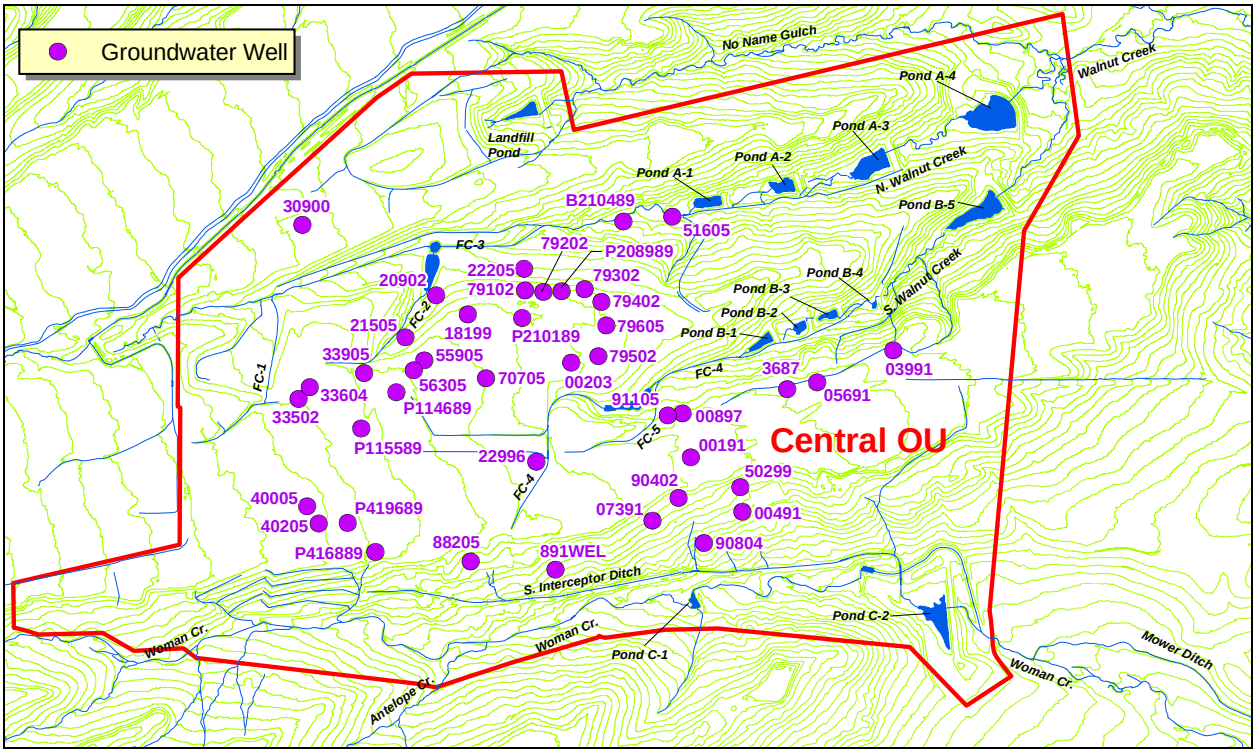



*Figure 6–8. Evaluation Well Locations*

### *Data and Sample Collection Protocols*

General monitoring information for Evaluation wells is provided in Table 6−16. Sampling frequencies are summarized in Table 6−17.

*Table 6−16. Evaluation Wells*

| Location Code | Location Description | Analytes[a] |
|---|---|---|
| 00191 | East of former 903 Pad area | VOCs |
| 00203 | Downgradient (southern) portion of SPP | VOCs, U |
| 00491 | Southeast of former 903 Pad area | VOCs |
| 00897 | Mound Site source area | VOCs |
| 3687 | East Trenches source area | VOCs |
| 03991 | East of East Trenches source area | VOCs |
| 05691 | East Trenches source area | VOCs |
| 07391 | Ryan's Pit source area | VOCs |
| 18199 | North of former IHSS 118.1 source area | VOCs |
| 20902 | Northwest of former IHSS 118.1 source area | VOCs |
| 21505 | West of former B776/777 area | VOCs |
| 22205 | Downgradient (northern) portion of SPP | VOCs, U |
| 22996 | East/northeastern part of former B886 area | U, nitrate |
| 30900 | PU&D Yard Plume source area | VOCs, U, nitrate |
| 33502 | Oil Burn Pit #1 source area | VOCs, U, nitrate |
| 33604 | Oil Burn Pit #1 source area | VOCs, U, nitrate |
| 33905 | North of former 231 Tanks area | VOCs |
| 40005 | Western part of former B444 area | VOCs |
| 40205 | Southern part of former B444 end | VOCs, U |
| 50299 | East of former 903 Pad area | VOCs |
| 51605 | Downgradient, adjacent to GS13 | VOCs, U |
| 55905 | Northern part of former B559 area | VOCs |
| 56305 | Western part of former B559 area | VOCs |
| 70705 | Eastern part of former B707 area | VOCs |
| 79102 | SPP source area - north | VOCs, U, nitrate |
| 79202 | SPP source area - north | VOCs, U, nitrate |
| 79302 | SPP source area - northeast | U, nitrate |
| 79402 | SPP source area - northeast | U, nitrate |
| 79502 | SPP source area - east | VOCs, U, nitrate |
| 79605 | SPP source area - east | VOCs |
| 88205 | Southern part of former B881 area | U, nitrate |
| 891WEL | OU1 Plume source area | U, nitrate |
| 90402 | Southeast of former 903 Pad area | VOCs, U |
| 90804 | Southeastern part of 903 Pad/Ryan's Pit Plume | VOCs |
| 91105 | Oil Burn Pit #2 source area | U, nitrate |
| B210489 | Downgradient of SPPTS | VOCs, U |
| P210189 | SEP-area VOC plume source area | VOCs, U, nitrate |
| P208989 | SPP source area - north | VOCs, U, nitrate |
| P114689 | Southwest of former B559 area | VOCs, U |
| P115589 | Western part of former B551 Warehouse area | VOCs, U |
| P419689 | Southeast of former B444 area | VOCs |
| P416889 | Southeast of former B444 area | VOCs |

Notes: [a]Samples for the analysis of U will be field-filtered using a 0.45-micron in-line filter.
Nitrate is analyzed as nitrate+nitrite as N; this result is conservatively compared to the nitrate standard only.

*Table 6−17. Sampling Frequency for Evaluation Wells*

| Sampling Frequency | Timing | Schedule Considerations |
|---|---|---|
| Biennial (every 2 years) | Second calendar quarter (high-water conditions) | Attempt to sample with other locations monitoring the same plume(s)/area(s) |

***Data Evaluation***

Analytical data from Evaluation wells are assessed according to the Figure 9 flowchart in RFLMA (Attachment A2). Analytical data evaluation may be performed as data become available, but only need to be reported in the corresponding annual report.

Review of data to determine whether monitoring may cease will be performed as analytical results approach exit requirements. When concentrations in a well exhibit a statistically significant decreasing trend at the 95 percent confidence level, **or** the 85th percentile concentration is less than the corresponding surface water standard or Evaluation well uranium threshold, then conditions will be reviewed with the regulatory agencies to seek approval to exit monitoring by well or analyte suite, as appropriate. Once monitoring has ceased, corresponding data reviews, data reporting, and monitoring decisions will no longer be required.

### 6.1.7 Investigative Monitoring

When reportable water quality measurements are detected by surface water monitoring at POEs or POCs, additional monitoring may be conducted to identify[7] the source and evaluate for mitigating action. Although not required by RFLMA, this investigative monitoring objective is intended to provide upstream water quality information if reportable water quality values are detected at POEs or POCs. Data collection is generally limited to POE and POC analytes and is intended to be discontinued once acceptable water quality has been demonstrated at POEs and POCs for an extended period.

Data collection is currently implemented at the locations shown on Figure 6–9 and described in Table 6−18. The majority of these locations are sampled primarily to satisfy other monitoring objectives, although the data are also used for this investigative objective. The current locations were not chosen in response to a specific source evaluation. They were chosen preemptively as a BMP immediately following completion of the RFP/RFETS Closure Project and are intended to be discontinued under this monitoring objective based on data evaluation. Any future data collection upstream of POEs and POCs, subject to the consultative process, is not limited to the locations on Figure 6–9. The RFLMA parties may also elect to collect data using other methods, subject to the characteristics of the reportable water quality values and through the consultative process.

[7] Note that the term “identify” is used here to mean “locate.” Characterization is also implied.

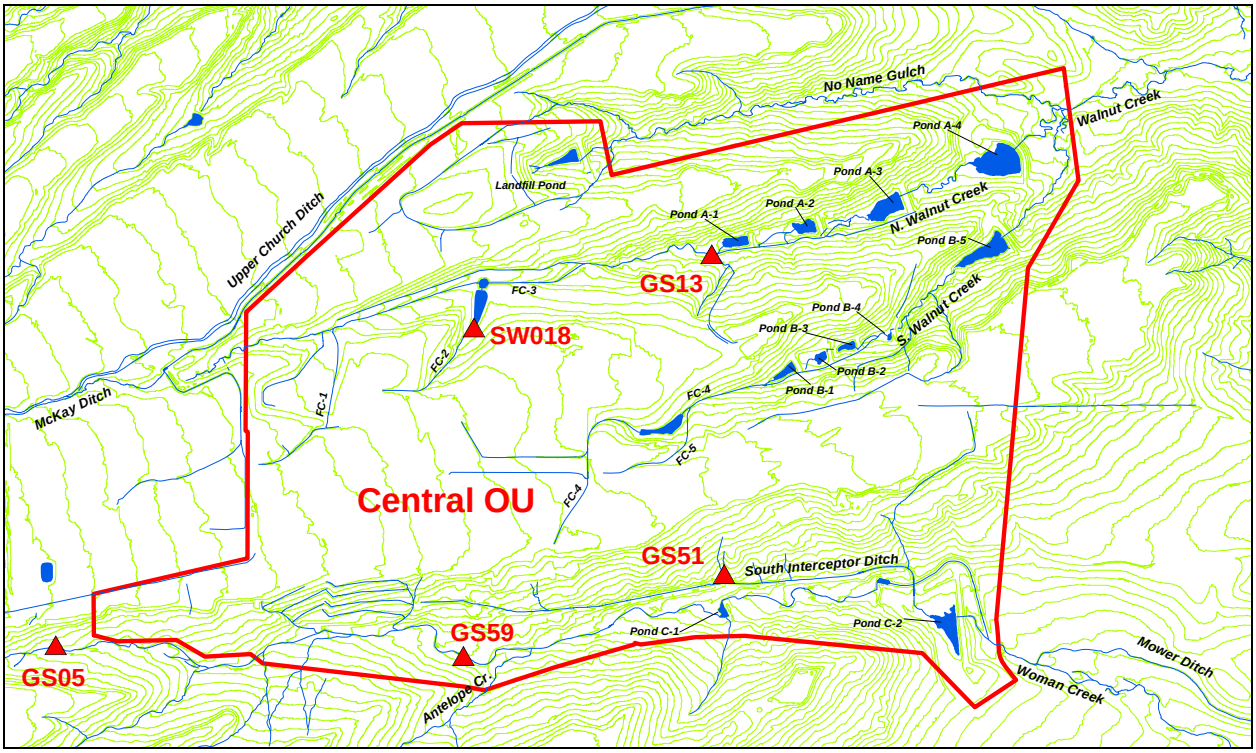



*Figure 6–9. Investigative Monitoring Locations*

*Table 6−18. Investigative Monitoring Locations*

| Location Code | Location Description | Primary Flow Measurement Device | Telemetry? |
|---|---|---|---|
| GS05 | Woman Creek at western Site boundary | 9-inch Parshall flume with weir insert | Yes |
| GS13 | North Walnut Creek just upstream of A-Series Bypass | 6-inch Parshall flume | Yes |
| GS51 | Drainage area south of 903 Pad/Lip tributary to the SID | 0.75-foot H-flume | Yes |
| GS59 | Woman Creek 700 feet east of the OLF | 1.5-foot Parshall flume | Yes |
| SW018 | North Walnut Creek tributary west of former B771 area | 1-foot H-flume | Yes |

### *Data and Sample Collection Protocols*

Details on instrumentation for the five current investigative locations are provided in Table 6−18. Continuous flow and precipitation data are currently collected using automated instrumentation (Table 6−19). Investigative locations currently collect continuous flow-paced composite samples for select analytes (Table 6−20). Table 6−20 also lists the primary monitoring objectives as applicable; these are the objectives required by RFLMA. Although the primary monitoring objective may require fewer samples than specified under this investigative objective, the additional data are expected to also be used under the primary objective. The method used to determine appropriate flow-pacing for composite samples is discussed in Section 8.1.1. Sample scheduling targets are listed in Table 6−21.

*Table 6−19. Investigative Field Data Collection: Parameters and Frequency*

| Location Code | Flow Rate | Precipitation |
|---|---|---|
| GS05 | 15-minute continuous | 5-minute continuous |
| GS13 | 15-minute continuous | 5-minute continuous |
| GS51 | 15-minute continuous | NA |
| GS59 | 15-minute continuous | 5-minute continuous |
| SW018 | 15-minute continuous | 5-minute continuous |

Note: All locations collect both 5- and 15-minute interval flow data. NA = not applicable

*Table 6−20. Investigative Sample Collection: Type and Analytes*

| Location Code | Type[a] | Analytes | Primary Monitoring Objective |
|---|---|---|---|
| GS05 | Continuous flow-paced composites[b] | isotopic U[c] | OLF Monitoring |
| GS13 | Continuous flow-paced composites[b]; grabs[d] | isotopic U[c]; nitrate[d] | Groundwater Treatment System Monitoring |
| GS51 | Continuous flow-paced composites | Pu-239,240; Am-241; TSS[e] | Investigative Monitoring |
| GS59 | Continuous flow-paced composites[b] | isotopic U[c] | OLF Monitoring |
| SW018 | Continuous flow-paced composites | Pu-239,240; Am-241; TSS[e] | Investigative Monitoring |

Notes: [a]Sample types are defined in Section 8.1.1.
[b]Only grab sampling, not flow-paced sampling, is required by the primary monitoring objective; flow-paced sampling is implemented at these locations for the Investigative objective.
[c]Isotopes U-233,234; U-235; U-238
[d]Nitrate will be collected at GS13 as semiannual grab samples. Nitrate is analyzed as nitrate+nitrite as N; this result is conservatively compared to the nitrate standard only.
[e]Total suspended solids (TSS) is analyzed when the composite sampling period is within TSS hold-time limits.

*Table 6−21. Investigative Monitoring Targets (Number of Composite Samples)*

| Month | Number of Samples | | | | |
|---|---|---|---|---|---|
| | GS05 | GS13 | GS51 | GS59 | SW018[a] |
| October | 1 | 1 | 1 | 1 | 1 |
| November | 0 | 0 | 0 | 0 | 1 |
| December | 1 | 1 | 0 | 1 | 0 |
| January | 0 | 1 | 0 | 0 | 1 |
| February | 0 | 1 | 1 | 0 | 0 |
| March | 2 | 1 | 1 | 2 | 1 |
| April | 3 | 2 | 2 | 3 | 1 |
| May | 1 | 1 | 1 | 1 | 1 |
| June | 0 | 0 | 1 | 0 | 1 |
| July | 0 | 0 | 0 | 0 | 1 |
| August | 0 | 0 | 0 | 0 | 0 |
| September | 0 | 0 | 1 | 0 | 0 |
| **Annual Total** | 8 | 8 | 8 | 8 | 8 |

Notes: [a]According to Figure 6–10 and through the consultative process, samples collected at SW018 were no longer routinely analyzed starting in FY 2008. Samples at SW018 will continue to be collected and archived for 6 months. If reportable values are subsequently observed at a downstream POE or POC, the archived samples may be analyzed as part of a source evaluation (see Section 9.6) subject to the consultative process.

Based on variability of past monitoring data and to achieve sufficient confidence for decision making, frequency targets for all investigative locations will be eight composites annually. Additionally, no more than three composites per month will be targeted (see Table 6−21).

The sample counts listed in Table 6−21 are targets only. During dry years, it is unlikely the targets will be achieved.

### *Data Evaluation*

Data collected at investigative monitoring locations are evaluated based on their ability to aid in a specific source evaluation. These evaluations include, but are not limited to, loading, fate and transport, correlations and trending, and other statistical evaluations (see Section 9.6 for additional information).

As stated previously, the current locations were not chosen in response to a specific source evaluation. They were chosen preemptively as a BMP immediately following completion of the RFP/RFETS Closure Project and are intended to be discontinued under this monitoring objective based on data evaluation. Decisions regarding the termination of data collection in support of investigative monitoring at the current locations (Figure 6–9) will be made according to the flowchart on Figure 6–10.

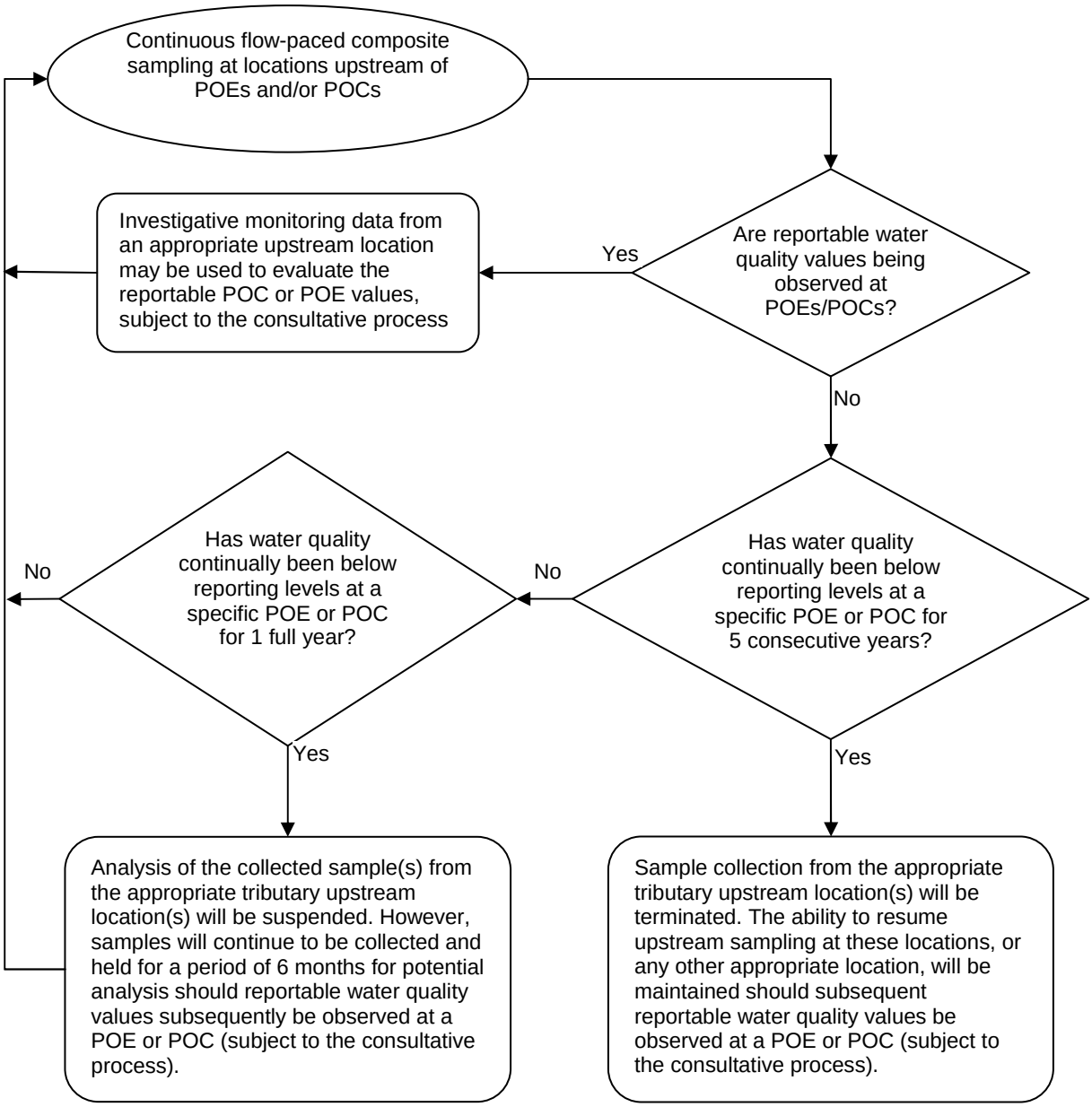
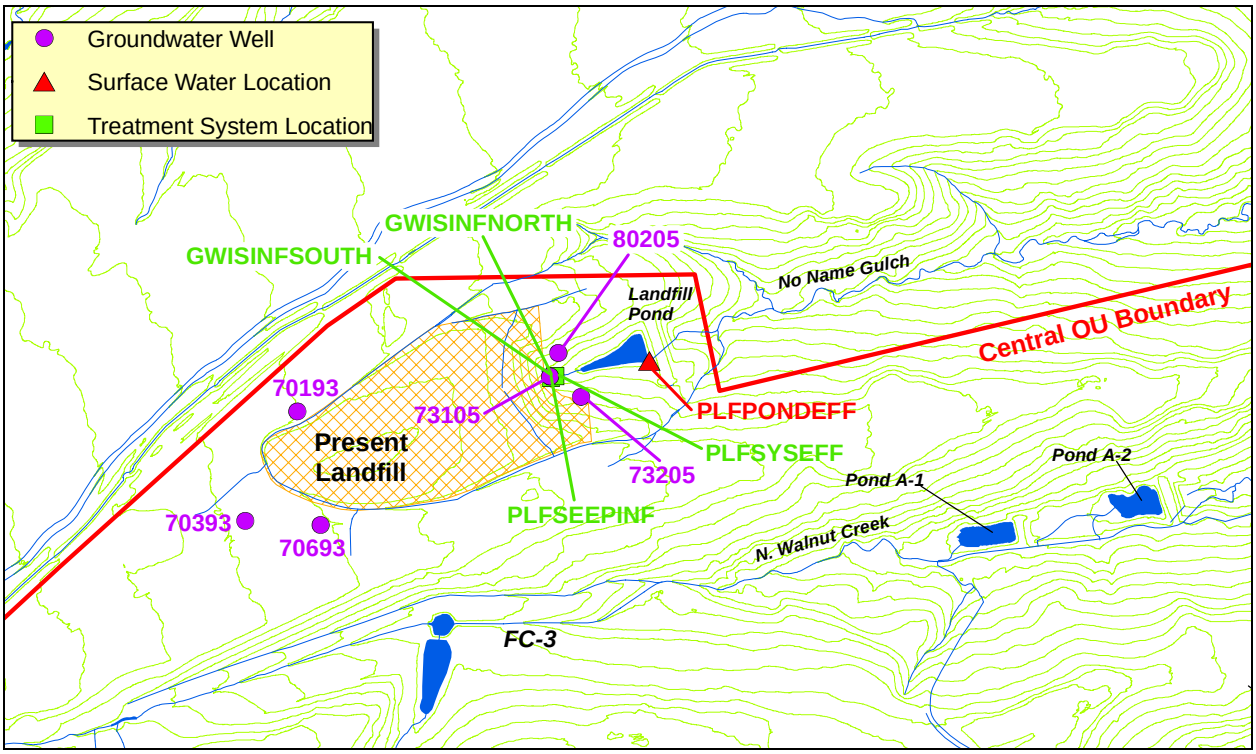



*Figure 6–10. Investigative Monitoring Flowchart*

### 6.1.8 PLF Monitoring

This objective deals with monitoring surface water and groundwater at the PLF to determine the short- and long-term effectiveness of the remedy. These requirements were initially identified in Appendix B of the *Final Interim Measure/Interim Remedial Action for IHSS 114 and RCRA Closure of the RFETS Present Landfill* (DOE 2004a) and finalized in the PLF M&M Plan (Attachment D2).

Water monitoring locations for the PLF are shown on Figure 6–11. The surface water and treatment system monitoring requirements that deal specifically with the PLFTS are discussed in detail in Section 6.1.10. Details regarding general groundwater monitoring are provided below.




Note: PLFSYSEFF serves as both the treatment system effluent and performance surface water location. Routine monitoring of GWISINFNORTH and GWISINFSOUTH has been discontinued as of FY 2008.

*Figure 6–11. PLF Monitoring Locations*

#### *Data and Sample Collection Protocols*

Monitoring wells supporting the PLF are classified as RCRA wells. Three of these wells are located upgradient of the landfill, and three are downgradient of the landfill but upgradient of the Landfill Pond. This network and the monitoring requirements are specified in the PLF M&M Plan (Attachment D2). Prior to late 2005 when this network was finalized, a different set of monitoring wells comprised the RCRA network for the PLF. As a result of this change, data from the current network cannot be compared accurately against data from the older network. Additional monitoring wells are present in the general vicinity of the PLF; however, they do not contribute to the RCRA monitoring of the facility and therefore are addressed elsewhere.

General monitoring information for the RCRA wells at the PLF is provided in Table 6−22. Sampling frequencies are summarized in Table 6−23.

*Table 6−22. RCRA Monitoring Wells at the PLF*

| Location Code | Location Description | Analytes[a] |
|---|---|---|
| 70193 | Upgradient (northwest) of the upgradient end of the PLF | VOCs, metals |
| 70393 | Upgradient (west/southwest) of the upgradient end of the PLF | VOCs, metals |
| 70693 | Upgradient (southwest) of the upgradient end of the PLF | VOCs, metals |
| 73005 | Downgradient (northeast) of the downgradient end of the PLF | VOCs, metals |
| 73105 | Downgradient (east) of the downgradient end of the PLF at the PLFTS | VOCs, metals |
| 73205 | Downgradient (southeast) of the downgradient end of the PLF | VOCs, metals |

Notes: [a]Samples for the analysis of metals will be field-filtered using a 0.45-micron in-line filter.
Laboratory analytes and analytical methods are limited to those listed in the PLF M&M Plan (Attachment D2).

*Table 6−23. Sampling Frequency for RCRA Wells at the PLF*

| Sampling Frequency | Timing | Schedule Considerations |
|---|---|---|
| Quarterly | Each calendar quarter | Attempt to sample all RCRA wells at the PLF as a group; if possible, also sample other PLF-area wells at the same time |

### *Data Evaluation*

Analytical data from RCRA wells at the PLF are assessed according to the Figure 10 flowchart in RFLMA (Attachment A2). Because similar rules guide the use of data at the OLF RCRA wells, this figure applies to both sets of RCRA wells.

Groundwater analytical data are generally reviewed as they become available and are formally evaluated annually. As shown on the Figure 10 flowchart in RFLMA (Attachment A2), this evaluation is designed to assess whether mean concentrations in downgradient wells are statistically different from those in upgradient wells, and whether concentrations show a significant increasing trend.

Review of data to determine whether monitoring may cease will be performed as described on the Figure 10 flowchart in RFLMA (Attachment A2) and will be based on the two previous periodic reviews. If the 85th percentile concentrations in each downgradient well are less than or equal to the applicable standards and indicate an indeterminate or decreasing trend at the 95 percent confidence level, termination of monitoring will be sought in discussions with the regulatory agencies. Once monitoring has ceased, corresponding data reviews, data reporting, and monitoring decisions will no longer be required.

## 6.1.9 OLF Monitoring

This objective deals with monitoring surface water and groundwater at the OLF to determine the short- and long-term effectiveness of the remedy. These requirements were initially identified in the *Draft Final IM/IRA of IHSS Group SW-2, IHSS 115, Original Landfill and IHSS 196, Filter*

*Backwash Pond*, Appendix B: Post-Accelerated Action Monitoring and Long-Term Surveillance and Monitoring Considerations (DOE 2004b). They were finalized in the OLF M&M Plan (Attachment D1). Water monitoring locations for the OLF are shown on Figure 6–12.

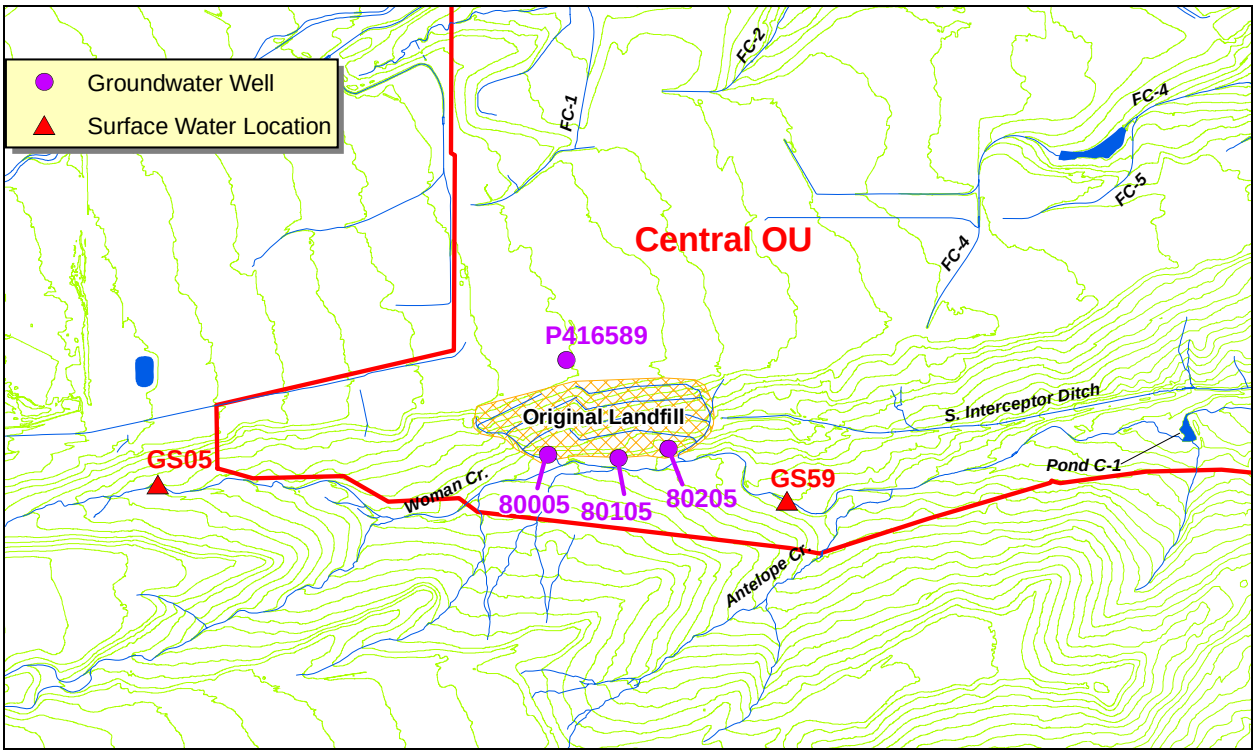



*Figure 6–12. OLF Monitoring Locations*

### *Data and Sample Collection Protocols*

Surface water in Woman Creek will be sampled both upstream (GS05) and downstream (GS59) of the OLF (Table 6−24). Table 6−25 presents a list of the analytes sampled for as part of the OLF surface water sampling.

*Table 6−24. OLF Surface Water Monitoring Locations*

| Location Code | Location Description | Primary Flow Measurement Device | Telemetry? |
|---|---|---|---|
| GS05 (upstream) | Woman Creek at western Site boundary | 9-inch Parshall flume with weir insert | Yes |
| GS59 (downstream) | Woman Creek 700 feet east of the OLF | 1.5-foot Parshall flume | Yes |

*Table 6−25. OLF Surface Water Sample Collection: Type and Analytes*

| Location Code | Type | Frequency | Analytes[a] |
|---|---|---|---|
| GS05 | Grabs[b] | Quarterly[b] | isotopic U[c]; total and dissolved metals; VOCs |
| GS59 | Grabs[b] | Quarterly[b] | isotopic U[c]; total and dissolved metals; VOCs |

Notes: [a]Laboratory analytes and analytical methods are limited to those listed in the OLF M&M Plan (Attachment D1).
[b]Quarterly grabs are the minimum requirement to meet the monitoring objective. Since automated samplers and flow measurement devices were in place at the end of closure, the current sampling consists of eight flow-paced composites collected annually (for uranium and metals). It is expected that sampling will gradually be reduced to the minimum requirement over time, subject to the consultative process.
[c]Isotopes U-233,234; U-235; U-238

Because complying with RCRA is an applicable or relevant and appropriate requirement (ARAR) at the OLF, the monitoring wells supporting the OLF are classified as RCRA wells. One is located upgradient of the landfill, and three are downgradient of the landfill but upgradient of Woman Creek. This network and the monitoring requirements are specified in the OLF M&M Plan (Attachment D1). Although earlier groundwater data exist for the OLF, RCRA monitoring at the landfill was not performed prior to late 2005 when this network was finalized. Likewise, although additional monitoring wells are present in the general vicinity of the OLF, they do not contribute to the RCRA monitoring and are addressed elsewhere.

General monitoring information for RCRA wells at the OLF is provided in Table 6−26. Sampling frequencies are summarized in Table 6−27.

*Table 6−26. RCRA Monitoring Wells at the OLF*

| Location Code | Location Description | Analytes[a] |
|---|---|---|
| P416589 | Upgradient (north) of the OLF | VOCs, SVOCs, metals |
| 80005 | Downgradient (south) of the western portion of the OLF | VOCs, SVOCs, metals |
| 80105 | Downgradient (south) of the central portion of the OLF | VOCs, SVOCs, metals |
| 80205 | Downgradient (south) of the eastern portion of the OLF | VOCs, SVOCs, metals |

Notes: [a]Samples for the analysis of metals will be field-filtered using a 0.45-micron in-line filter.
Laboratory analytes and analytical methods are limited to those listed in the OLF M&M Plan (Attachment D1).
SVOC = semivolatile organic compound

*Table 6−27. Sampling Frequency for RCRA Wells at the OLF*

| Sampling Frequency | Timing | Schedule Considerations |
|---|---|---|
| Quarterly | Each calendar quarter | Attempt to sample all RCRA wells at the OLF as a group; if possible, also sample other OLF-area wells at the same time |

### *Data Evaluation*

Compliance with surface water quality standards at the OLF is demonstrated by the Figure 12 flowchart in RFLMA (Attachment A2). Generally, surface water analytical data evaluation is performed as data become available. If an initial qualitative screening indicates an analytical

result is higher than the standard for a particular analyte, then the compliance values are calculated immediately. If the compliance values suggest initiation of the consultative process, then validation is requested for all data packages used in the calculation.

Analytical data for RCRA wells at the OLF are assessed according to the Figure 10 flowchart in RFLMA (Attachment A2). Because similar rules guide the use of data at the PLF RCRA wells, this figure applies to both sets of RCRA wells.

Groundwater analytical data are generally reviewed as they become available, and are formally evaluated annually. As shown on the Figure 10 flowchart in RFLMA (Attachment A2), this evaluation is designed to assess whether mean concentrations in downgradient wells are statistically different from those in upgradient wells, and whether downgradient concentrations show a significant increasing trend and the 85th percentile concentration is above the applicable standard. This latter component of the comparison is modeled after the statistical evaluation of Sentinel well data; see the Figure 10 flowchart in RFLMA (Attachment A2) for the associated data evaluation process.

Groundwater data will be reviewed, as described on the Figure 10 flowchart in RFLMA (Attachment A2), to determine whether monitoring may cease. This review will be based on the results of upgradient/downgradient water quality comparisons, 85th percentile concentrations in each downgradient well, and trending. Once monitoring has ceased, corresponding data reviews, data reporting, and monitoring decisions will no longer be required.

### 6.1.10 Groundwater Treatment System Monitoring

Contaminated groundwater is intercepted and treated in four areas of the Site. Three of the treatment systems (MSPTS, ETPTS, and SPPTS) include a groundwater intercept trench (collection trench), which is similar to a French drain with an impermeable membrane on the downgradient side. Groundwater entering the trench is routed through a drain pipe into one or more treatment cells, where it is treated and then discharged to surface water. The fourth system (PLFTS) treats water from the north and south components of the GWIS and flow from the PLF Seep.

The MSPTS was installed in 1998, the ETPTS and SPPTS were installed in 1999, and the PLFTS was installed in 2005. Improvements to the SPPTS were installed in 2008, and additional improvements are planned for 2009 and beyond. Additional information on these systems is provided below and in the O&M Manual for Groundwater Treatment Systems (Attachment C1). Although additional information for these systems is available in many documents, the following original decision documents may be most helpful:

- *Final Mound Site Plume Decision Document* (DOE 1997);
- *Final Proposed Action Memorandum for the East Trenches Plume* (DOE 1999a);
- *Final Solar Ponds Plume Decision Document* (DOE 1999b); and
- PLF M&M Plan (Attachment D2).

Water monitoring for the MSPTS, ETPTS, and SPPTS includes a minimum of three sample collection points each: untreated influent entering the treatment system, treated effluent exiting

the system, and a surface water performance location. At the PLFTS, the treated effluent and surface water sampling locations are typically the same; this is discussed in further detail below.

The fundamental questions at each system are whether (1) influent water quality indicates treatment is still necessary, (2) effluent water quality indicates system maintenance is required, and (3) surface water quality suggests impacts from inadequate treatment of influent.

***Mound Site Plume Treatment System***

As noted above, the MSPTS was installed in 1998; it was the first such system at the Site. Because components of this passive treatment system represented new technology at the time, EPA partially funded its installation. VOC-contaminated groundwater collects in the intercept trench and is piped to treatment cells filled with zero-valent iron (ZVI), which treats the VOCs by means of reductive dechlorination. Because this system experienced a significant change in 2005 in the amount of water it receives, the following information is included to provide additional background.

The MSPTS was originally designed to intercept and treat a plume of contaminated groundwater migrating toward South Walnut Creek from the Mound Site (also referred to simply as the Mound and designated as IHSS 113), from which contaminated soils were removed in 1997 (Figure 6–13). Since 2005, the MSPTS also intercepts and treats contaminated groundwater from Oil Burn Pit #2 (IHSS 153) as it migrates toward South Walnut Creek. Contaminated soil was removed from Oil Burn Pit #2 in 2005. Groundwater at both of these source areas is monitored using Evaluation wells (well 00897 for the Mound, 91105 for Oil Burn Pit #2).

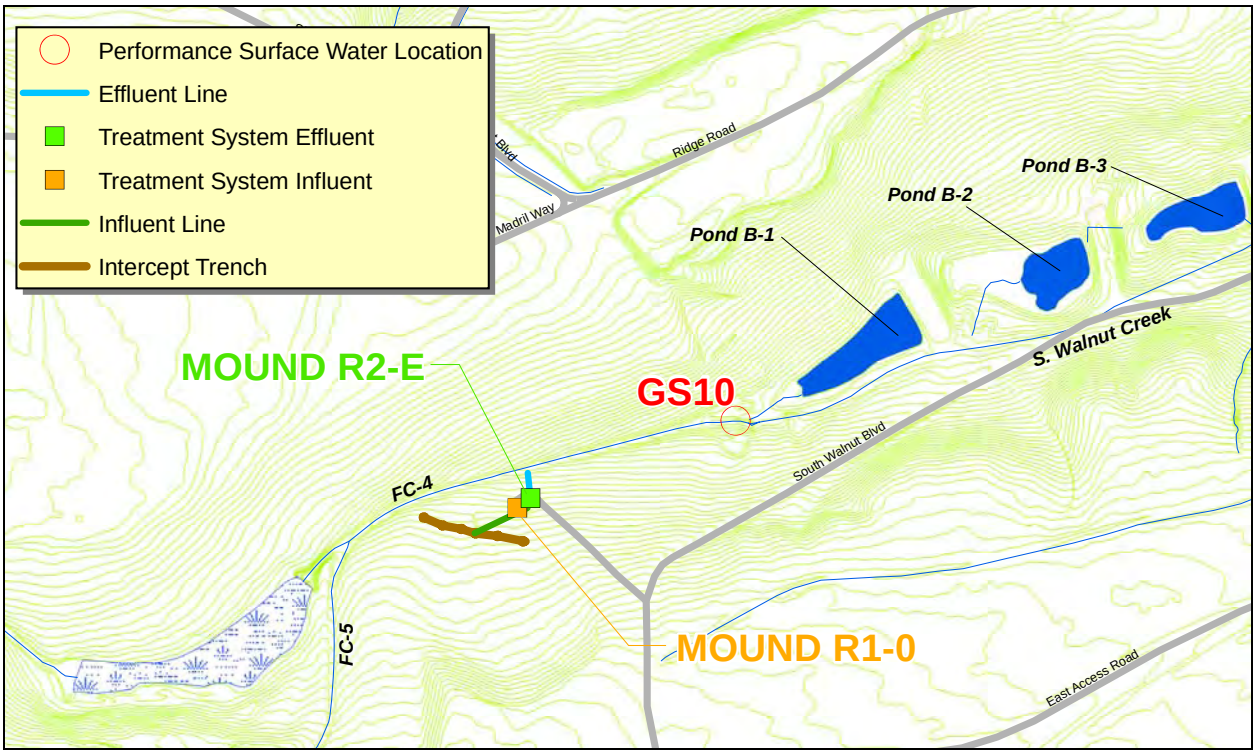



*Figure 6–13. MSPTS Monitoring Locations*

During Site closure efforts in 2005, a 72-inch storm drain that extended north from the area of Oil Burn Pit #2 to South Walnut Creek was removed. To address the potential for contaminants discharging to South Walnut Creek via the preferential flow path represented by the remaining backfilled trench, a gravel drain was installed to divert groundwater from this trench to the MSPTS intercept trench. Influent to the MSPTS increased by roughly an order of magnitude following this activity, from approximately 0.1 to 0.2 gallon per minute (gpm) or less to slightly more than 1.0 gpm. It has since decreased to approximately 0.6 to 0.7 gpm, based on data for 2007.

Shortly after this linkage was formed, the MSPTS effluent water quality degraded. Constituents such as tetrachloroethene, trichloroethene, and cis-1,2-dichloroethene were detected in the effluent, and concentrations appeared to be increasing (DOE 2006c). Simultaneously, crusting and solidification of the ZVI in the cells significantly decreased media permeability. The MSPTS media was replaced in summer 2006 to address the decrease in treatment effectiveness. At the same time, additional automated instrumentation was installed to support O&M of the system by allowing Site personnel to optimize the performance of the treatment cells, thereby reducing the frequency of costly ZVI replacements. For additional information on system maintenance and operation, refer to the O&M Manual for Groundwater Treatment Systems (Attachment C1).

#### *Data and Sample Collection Protocols*

Monitoring locations specific to the MSPTS are displayed on Figure 6–13. General monitoring information for these locations is provided in Table 6−28. Sampling frequencies are summarized in Table 6−29. In addition to the monitoring locations shown, several piezometers are present within the collection trench. Although these are no longer routinely monitored, they are retained for troubleshooting purposes as described in the O&M Manual for Groundwater Treatment Systems (Attachment C1).

*Table 6−28. MSPTS Sampling Locations*

| Location Code | Location Description | Analytes[a] |
|---|---|---|
| Mound R1-0 | Influent sampling location | VOCs |
| Mound R2-E | Effluent sampling location | VOCs |
| GS10 | Downgradient surface water performance location | VOCs |

Notes: [a]Samples for the analysis of VOCs at all of the above locations will be collected as grab samples. Other required GS10 monitoring objectives and samples are not addressed here.

*Table 6−29. Sampling Frequency for MSPTS Sampling Locations*

| Sampling Frequency | Timing | Schedule Considerations |
|---|---|---|
| Semiannual | Second and fourth calendar quarters (high- and low-water conditions, respectively) | Attempt to sample all MSPTS-area locations as a group |

#### *Data Evaluation*

The data evaluation process guiding the use of analytical data for the MSPTS locations is shown on the Figure 11 flowchart in RFLMA (Attachment A2). Because similar rules guide the use of data at the ETPTS, SPPTS, and PLFTS, this figure applies to those systems as well.

Compliance with surface water quality standards (Table 1 of Attachment 2 to RFLMA) at the MSPTS is demonstrated by the Figure 11 flowchart in RFLMA. Generally, analytical data evaluation is performed as data become available. This is particularly important for VOC data from performance location GS10, as described below. If the data suggest additional system maintenance is required, additional inspections and data collection are performed to confirm and support this issue. Data are reported in the corresponding quarterly report and evaluated in the annual report.

In addition to the increase in flows, influent water quality also changed significantly following connection of the Oil Burn Pit #2 pathway to the MSPTS intercept trench. Residual contamination in the Oil Burn Pit #2 source area was addressed during the accelerated action at that location via the addition of HRC® to the excavation backfill. As a result, degradation byproducts are seen at markedly higher concentrations in MSPTS influent than was the case prior to the connection with the Oil Burn Pit #2 pathway. Some of these byproducts are recalcitrant and resist complete removal via ZVI treatment, which can result in their detection in treated effluent. Consultation on this subject with CDPHE was held in 2008; the conclusion at that time was that as long as surface water performance samples continue to show water quality meets RFLMA Table 1 standards, no action beyond continued monitoring and evaluation is required. Therefore, prompt review of GS10 VOC data is warranted, and regular communication with the lead regulatory agency is important to ensure awareness of current conditions.

The determination of whether the MSPTS may be closed is made using influent water quality data and in consultation with the regulatory agencies. Once monitoring has ceased, corresponding data reviews, data reporting, and monitoring decisions will no longer be required.

### *East Trenches Plume Treatment System*

The ETPTS treated an annual average of approximately 1.8 gpm in 2007; however, previous annual averages have ranged from approximately 1 to 4 gpm. This system was installed in 1999. It is modeled after the MSPTS and consists of a groundwater intercept trench that collects and diverts VOC-contaminated groundwater to cells containing ZVI, which treats the water (Figure 6–14). Completion of the groundwater intercept trench was difficult because of repeated sloughing of the trench sides, particularly where the trench intersects the basal Arapahoe Formation sandstone. Since installation, the ETPTS has required more frequent ZVI replacement than originally anticipated due to reduced permeability of the iron caused by the media becoming clogged with mineral precipitates. Following completion of the RFP/RFETS Closure Project and transfer of operations to DOE-LM, additional automated instrumentation was installed at the ETPTS. This instrumentation is intended to support the O&M of this system by allowing Site personnel to optimize the performance of the treatment cells, thereby reducing the frequency of costly ZVI replacements. For additional information on system maintenance and operation, refer to the O&M Manual for Groundwater Treatment Systems (Attachment C1).

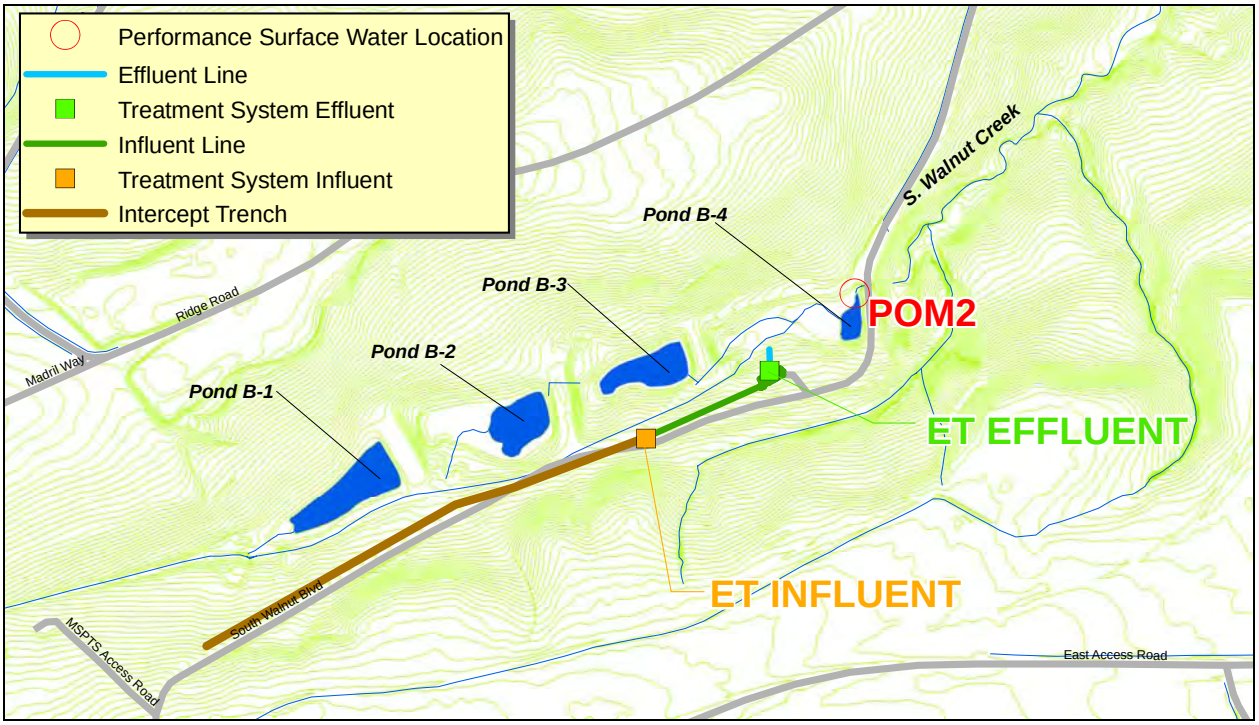



*Figure 6–14. ETPTS Monitoring Locations*

### *Data and Sample Collection Protocols*

Monitoring locations specific to the ETPTS are displayed on Figure 6–14. General monitoring information for these locations is provided in Table 6−30. Sampling frequencies are summarized in Table 6−31. In addition to the monitoring locations shown, several piezometers are present within the collection trench. Although these are no longer routinely monitored, they are retained for troubleshooting purposes as described in the O&M Manual for Groundwater Treatment Systems (Attachment C1).

*Table 6−30. ETPTS Sampling Locations*

| Location Code | Location Description | Analytes[a] |
|---|---|---|
| ET INFLUENT | Influent sampling location | VOCs |
| ET EFFLUENT | Effluent sampling location | VOCs |
| POM2[b] | Downgradient surface water performance location | VOCs |

Notes: [a]Samples for the analysis of VOCs at all of the above locations will be collected as grab samples.
[b]The original POM2 location will be destroyed during the breaching of Dam B-4, and a replacement location will be established. All sampling and data evaluation requirements associated with POM2, including decisions, will apply equally to the new location. See text for additional discussion.

*Table 6−31. Sampling Frequency for ETPTS Sampling Locations*

| Sampling Frequency | Timing | Schedule Considerations |
|---|---|---|
| Semiannual | Second and fourth calendar quarters (high- and low-water conditions, respectively) | Attempt to sample all ETPTS-area locations as a group |

#### *Data Evaluation*

The data evaluation process guiding the use of analytical data from ETPTS locations is shown on the Figure 11 flowchart in RFLMA (Attachment A2). Because similar rules guide the use of data at the MSPTS, SPPTS, and PLFTS, this figure applies to those systems as well.

Compliance with surface water quality standards (Table 1 of Attachment 2 to RFLMA) at the ETPTS is demonstrated by the Figure 11 flowchart in RFLMA. Generally, analytical data evaluation is performed as data become available. If the data suggest additional system maintenance is required, additional inspections and data collection are performed to confirm and support this issue. Data are reported in the corresponding quarterly report and are evaluated in the annual report.

As with the MSPTS, VOCs may be detected in ETPTS effluent, a condition that was discussed with CDPHE in 2008. The conclusion at that time was that as long as surface water performance samples continue to show water quality meets RFLMA Table 1 standards, no action beyond continued monitoring and evaluation is required. Prompt review of POM2 VOC data is therefore warranted, and regular communication with the lead regulatory agency is important to ensure awareness of current conditions.

In FY 2009, the dams for Ponds B-1, B-2, B-3, and B-4 (as well as several in the A-series) will be breached. This should not affect operation of the ETPTS, but will require replacement of POM2 given that the original location will be within the footprint of the construction activities. As with the replacement of any required monitoring location, CDPHE will be consulted in advance of establishing the replacement location to ensure it is acceptable. Once POM2 is replaced, the new location will satisfy the requirements of and be evaluated as the surface water performance location for the ETPTS. The next revision of the RFSOG will update this location identification and placement on Figure 6–14, as necessary.

The determination of whether the ETPTS may be closed is made using influent water quality data and in consultation with the regulatory agencies. Once monitoring has ceased, corresponding data reviews, data reporting, and monitoring decisions will no longer be required.

### *Solar Ponds Plume Treatment System*

The SPPTS was installed in 1999 to treat elevated concentrations of nitrate and uranium in groundwater (Figure 6–15). The media in this system includes one cell containing sawdust and ZVI, and a second containing gravel and ZVI.

Until late 2008, treated effluent from the system was routed through a perforated line remaining from the older (circa 1980) Intercept Trench System (ITS) and discharged to the subsurface. This is why samples collected from the discharge area prior to October 2008 showed elevated nitrate and uranium levels even though the system effluent itself was adequately treated. In September and October 2008, Phase I upgrades to the SPPTS were completed: a sump (the Intercept Trench System Sump [ITSS]) was installed that collects the untreated water from the ITS remnants that are downgradient of the system. This water is then pumped to the system for treatment. Additionally, a new effluent line (i.e., nonperforated) was installed so that treated water is not recontaminated by being commingled with ITS water before discharge. Since these

improvements were completed, the quality of the water that is discharged is very similar to system effluent.

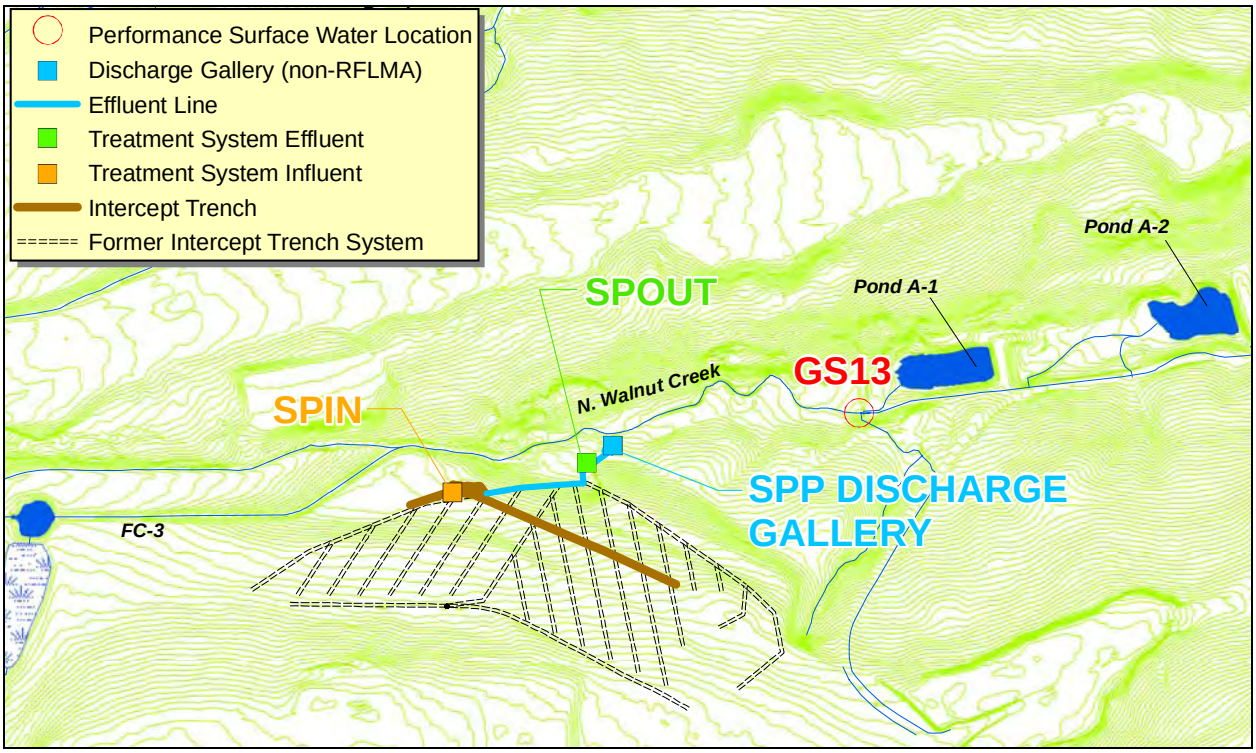



*Figure 6–15. SPPTS Monitoring Locations*

Flow through the SPPTS has historically varied from 0 gpm (no flow) to at least 7 gpm; annual averages are under 1 gpm (the average for 2007 was approximately 0.5 gpm). Based on the first 2 months of data since completion of the Phase I upgrades, addition of water from the ITSS has roughly doubled the flow through the SPPTS (which averaged approximately 0.8 gpm through the end of 2008) and doubled to tripled concentrations of nitrate in the influent, while simultaneously increasing concentrations of uranium in system influent by about one-half. Spring conditions (higher flow rates) are expected to increase the flow to the system much more. These conditions have reduced the hydraulic residence time within the system, compromising the ability of the existing treatment media to reduce contaminants to target levels. Possible methods of improving treatment in the short term are under consideration.

For the longer term, Phase II improvements (scheduled for spring 2009) will include a new uranium treatment cell that will be installed as the first treatment cell (so that future nitrate treatment media will not be considered radioactive waste). Pilot-scale testing of alternative nitrate treatment media will be conducted as Phase III, and a full-scale overhaul of the nitrate treatment cell (Phase IV) will be evaluated based on the results of Phase III.

When this RFSOG is updated in FY 2010, the text addressing the SPPTS will be updated to reflect changes to the system that will have been made to date. Changes will also be made to the O&M Manual for Groundwater Treatment Systems (Attachment C1), which has been updated

for this version of the RFSOG to reflect the Phase I improvements. Refer to that document for additional information on system maintenance.

***Data and Sample Collection Protocols***

Monitoring locations specific to the SPPTS are presented on Figure 6–15. General monitoring information for these locations is provided in Table 6−32. Sampling frequencies are summarized in Table 6−33. In addition to the monitoring locations, several piezometers were installed within the collection trench. Although these are no longer routinely monitored, they are retained for troubleshooting purposes as described in the O&M Manual for Groundwater Treatment Systems (Attachment C1). Note that the effluent monitoring point was revised as a result of the Phase I improvements; this change will be made to RFLMA along with several other changes, as noted elsewhere.

*Table 6−32. SPPTS Sampling Locations*

| Location Code | Location Description | Analytes[a] |
|---|---|---|
| SPIN | Influent sampling location | U, nitrate |
| SPOUT[b] | Effluent sampling location | U, nitrate |
| SPP Discharge Gallery[c] | Pooled effluent above buried Discharge Gallery | U, nitrate |
| GS13[d] | Downgradient surface water performance location | U, nitrate |

Notes: [a]Influent and effluent samples for the analysis of U will be filtered in the field using a 0.45-micron in-line filter. Nitrate is analyzed as nitrate+nitrite as N; this result is conservatively compared to the nitrate standard only.
[b]Effluent samples are collected at SPOUT, which is located in the battery vault by the ITSS, rather than from SPPMM01 in the manhole adjacent to the treatment cells.
[c]The RFLMA does not require sampling of the SPP Discharge Gallery. However, DOE has agreed to continue to monitor this location as requested by downstream communities.
[d]Samples collected for U at GS13 will typically be flow-paced, unfiltered, and analyzed for U isotopes; however, if desired they may be collected as grab samples and filtered consistent with influent and effluent collection methods. U data at GS13 support other monitoring objectives that are not addressed here.

*Table 6−33. Sampling Frequency for SPPTS Sampling Locations*

| Sampling Frequency | Timing | Schedule Considerations |
|---|---|---|
| Semiannual | Second and fourth calendar quarters (high- and low-water conditions, respectively) | Attempt to sample all SPPTS-area locations as a group |

***Data Evaluation***

The data evaluation process guiding the use of analytical data from SPPTS locations is shown on the Figure 11 flowchart in RFLMA (Attachment A2). Because similar rules guide the use of data at the MSPTS, ETPTS, and PLFTS, this figure applies to those systems as well.

Compliance with surface water quality standards (Table 1 of Attachment 2 to RFLMA) at the SPPTS is demonstrated by the Figure 11 flowchart in RFLMA. Generally, analytical data evaluation is performed as data become available. If the data suggest additional system maintenance is required, additional inspections and data collection are performed to confirm and

support this issue. Data are reported in the corresponding quarterly report and are evaluated in the annual report.

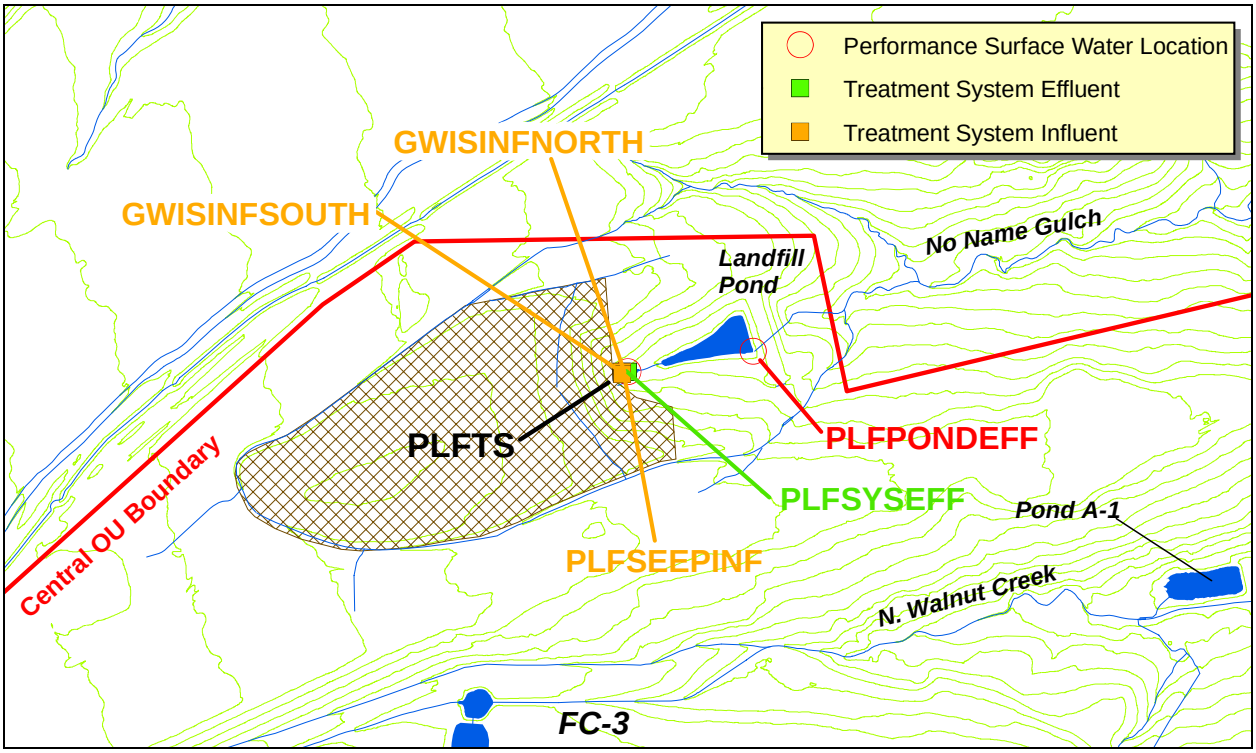
Because the SPP Discharge Gallery is not a RFLMA monitoring location, there are no data evaluation requirements associated with this location. For convenience, water quality at this location is assessed in the same manner as the other locations; however, results of this evaluation do not force any decisions.

The determination of whether the SPPTS may be closed is made using influent water quality data and in consultation with the regulatory agencies. Once monitoring has ceased, corresponding data reviews, data reporting, and monitoring decisions will no longer be required.

***Present Landfill Treatment System***

This objective deals with monitoring the PLFTS to determine the short- and long-term effectiveness of the remedy. These requirements were initially identified in the *Final Interim Measures/Interim Remedial Action for IHSS 114 and RCRA Closure of the RFETS Present Landfill*, Appendix B: Post-Accelerated Action Monitoring and Long-Term Surveillance and Monitoring Considerations (DOE 2004a), and finalized in the PLF M&M Plan (Attachment D2).

Water monitoring locations for the PLFTS and sampling location details are shown on Figure 6–16 and Figure 6–17. Groundwater monitoring for the PLF is discussed in detail in the section above. Details regarding PLFTS monitoring are provided below.




Note: PLFSYSEFF serves as both the treatment system effluent and a performance surface water monitoring location. Routine monitoring of GWISINFNORTH and GWISINFSOUTH has been discontinued as of FY 2008.

*Figure 6–16. PLFTS Monitoring Locations*

***Data and Sample Collection Protocols***

The PLFTS is routinely sampled at the treatment system influent and effluent sampling location (National Pollutant Discharge Elimination System [NPDES] outfall (Table 6−34 and Table 6−35). Routine sampling of GWISINFNORTH and GWISINFSOUTH has been discontinued but is included in the evaluations required in RFLMA Attachment 2, Figure 11. These sampling locations may be used for investigation purposes. Additional monitoring detail is included in the PLF M&M Plan (Attachment D2).

*Table 6−34. PLFTS Water Monitoring Locations*

| Location Code | Location Description |
|---|---|
| PLFSEEPINF | Seep influent to treatment system |
| GWISINFNORTH | North GWIS influent to treatment system (discontinued) |
| GWISINFSOUTH | South GWIS influent to treatment system (discontinued) |
| PLFSYSEFF | PLFTS effluent |
| PLFPONDEFF | Landfill Pond water near pond discharge location (eastern end) |

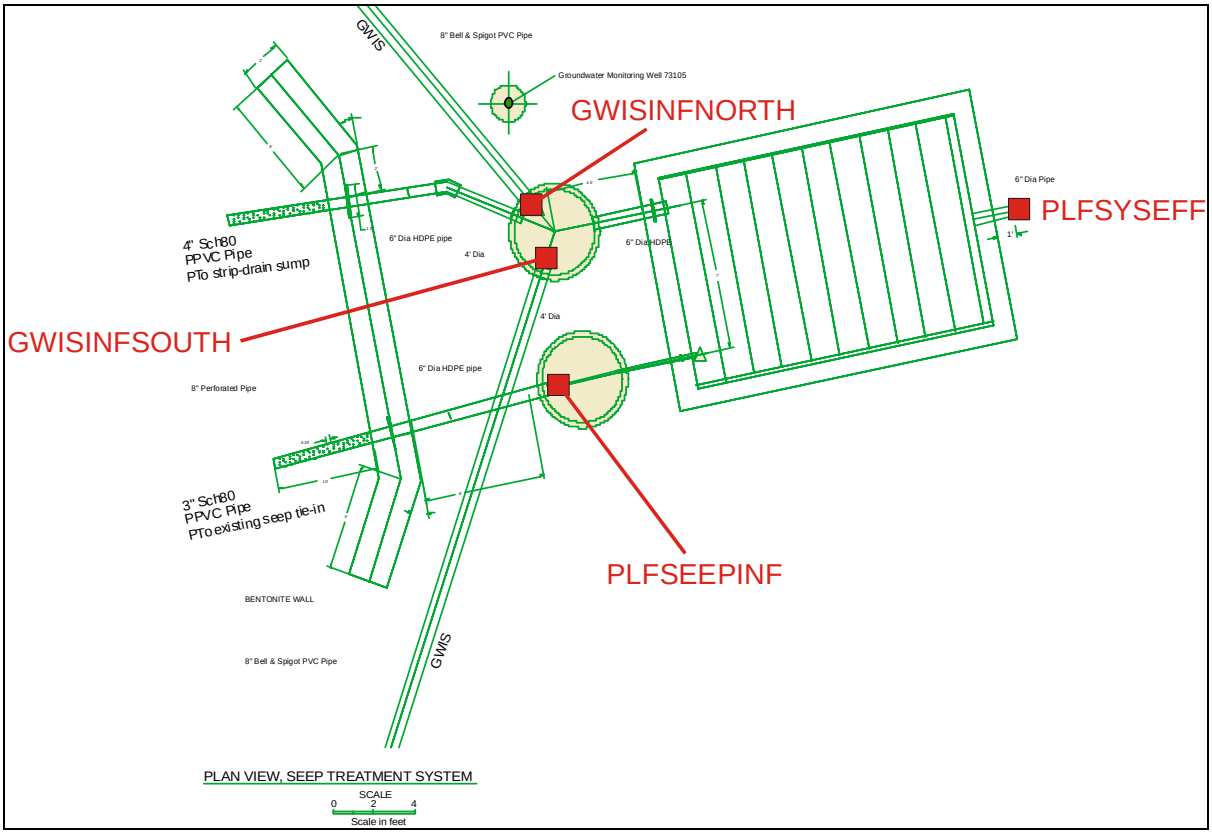



*Figure 6–17. PLFTS Sampling Locations (Detail)*

*Table 6−35. PLFTS Sample Collection: Type and Analytes*

| Location Code | Type | Frequency | Analytes[a] |
|---|---|---|---|
| PLFSEEPINF | Grab | Quarterly | Isotopic U[b]; total and dissolved metals; VOCs; manual flow measurement (field) |
| GWISINFNORTH[c] | Grab | Discontinued | NA |
| GWISINFSOUTH[c] | Grab | Discontinued | NA |
| PLFSYSEFF | Grab | Quarterly; monthly by decision[d] | Isotopic U[b]; total and dissolved metals; VOCs; SVOCs |
| PLFPONDEFF | Grab | Determined by decision[d] | Determined by decision[d] |

Notes: [a]Laboratory analytes and analytical methods are limited to those listed in the PLF M&M Plan (Attachment D2). Nitrate is analyzed as nitrate+nitrite; the nitrate+nitrite result is conservatively compared to the nitrate standard only.
[b]Isotopes U-233,234; U-235; U-238
[c]According to the Figure 11 flowchart in RFLMA (Attachment A2) and through the consultative process, samples are no longer being collected from the GWIS as of FY 2008.
[d]Refer to the decision logic on the Figure 11 flowchart in RFLMA (Attachment A2).

***Data Evaluation***

Compliance with surface water quality standards (Table 1 of Attachment 2 to RFLMA) at the PLFTS is demonstrated by the Figure 11 flowchart in RFLMA. Because similar rules guide the use of data at the MSPTS, ETPTS, and SPPTS, this figure applies to those systems as well.

Generally, analytical data evaluation is performed as data become available. If an initial qualitative screening indicates an analytical result is higher than the standard for a particular analyte, then the compliance values are calculated immediately. If the compliance values suggest initiation of the consultative process, then validation is requested for all data packages used in the calculation.

The determination of whether the PLFTS may be closed is made using influent water quality data and in consultation with the regulatory agencies. Once monitoring has ceased, corresponding data reviews, data reporting, and monitoring decisions will no longer be required. The decision to end monitoring at the PLFTS will be documented in a RFLMA Contact Record and incorporated into Attachment 2 to RFLMA during the next revision of RFLMA. The PLF M&M Plan (Attachment D2) would also need to be modified to reflect the end of operation of the treatment system.

### 6.1.11 Pre-Discharge Monitoring

This monitoring objective deals with pre-discharge sampling of Ponds A-4, B-5, and C-2, or any other upstream pond functioning as a terminal pond, as a BMP to indicate compliance with surface water quality standards (Table 1 of Attachment 2 to RFLMA) at the downstream POCs. Pre-discharge samples will be collected at Ponds A-4, B-5, and C-2 on North Walnut Creek, South Walnut Creek, and Woman Creek, respectively. These locations are shown on Figure 6–18.

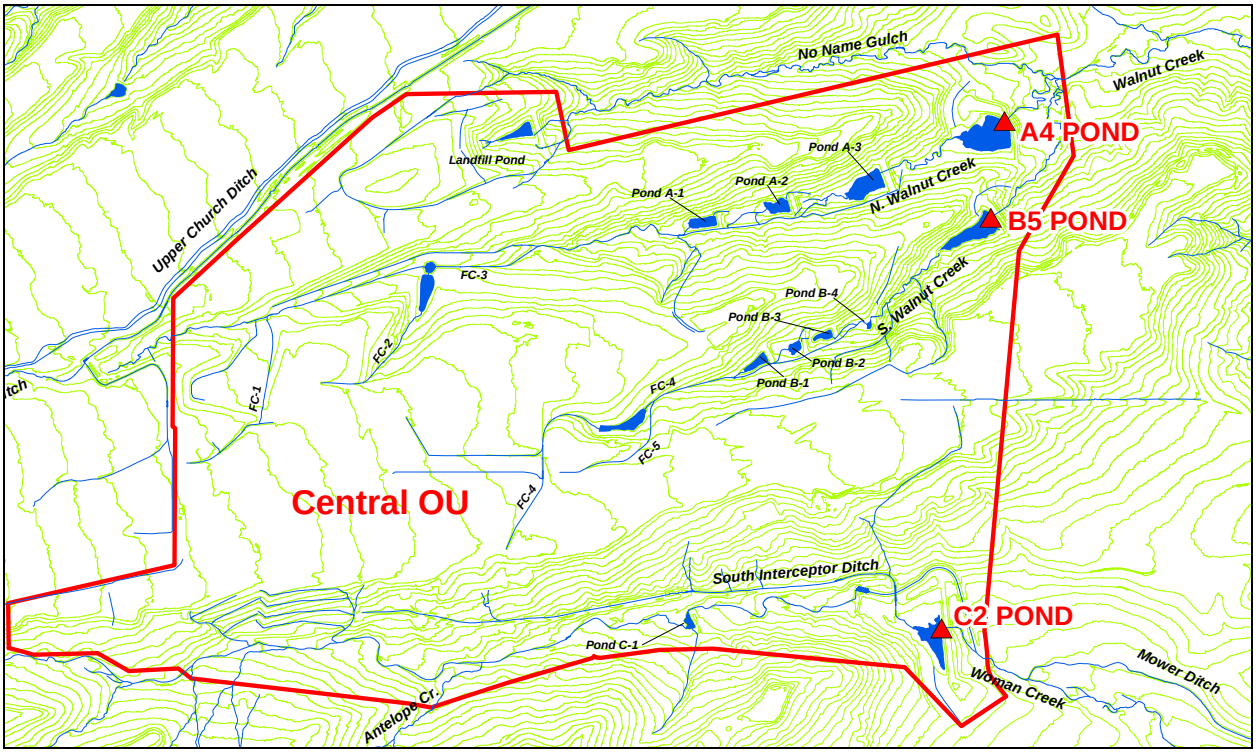



*Figure 6–18. Pre-Discharge Sampling Locations*

### *Data and Sample Collection Protocols*

Pre-discharge samples are collected as grab samples for POC analytes only (Table 6−36). Samples should represent the water to be discharged (i.e., grab sample locations in each pond should be chosen appropriately, and any addition of water to the discharge should be minimized after the grab sample is collected[8]).

*Table 6−36. Pre-Discharge Sample Collection: Type and Analytes*

| Location Code | Sample Type | Analytes |
|---|---|---|
| A4 POND | Grab | Pu-239,240; Am-241; isotopic U[a]; nitrate |
| B5 POND | Grab | Pu-239,240; Am-241; isotopic U[a]; nitrate |
| C2 POND | Grab | Pu-239,240; Am-241; isotopic U[a] |

Notes: [a]Isotopes U-233,234; U-235; U-238
Nitrate is analyzed as nitrate+nitrite; the nitrate+nitrite result is conservatively compared to the nitrate standard only.

This pre-discharge monitoring is limited to Ponds A-4, B-5, and C-2, or any other upstream pond temporarily functioning as a terminal pond. Site personnel will notify the appropriate parties in accordance with the Figure 13 flowchart in RFLMA (Attachment A2) in advance of pre-discharge pond sampling. CDPHE and EPA will be allowed the opportunity to collect duplicate

[8] Pond A-4 is the only terminal pond that can be easily isolated from significant upstream inflows. However, pre-discharge samples will be routinely analyzed on short turnaround to limit the amount of inflow to Ponds B-5 and C-2 after sampling.